Panasonic
ideas for life

Introduction of Newly Developed Infrared Array Sensor "Grid-EYE"

04.04.2011

Panasonic Electric Works Co., Ltd.

Contents

Contents

PEW History

1918 Matsushita Electric founded by Konosuke Matsushita

1935 Forerunners of Matsushita Electric Industrial (MEI)
& Matsushita Electric Works (MEW) created

2008 Panasonic Electric Works Co., Ltd.

Konosuke Matsushita
(1894-1989)

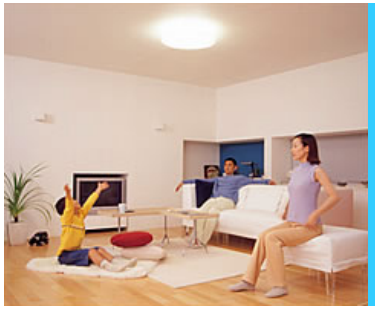
Headquarter Osaka

Headquarter Tokyo

Attachment Plug
(1918)

Two-way Socket
(1920)

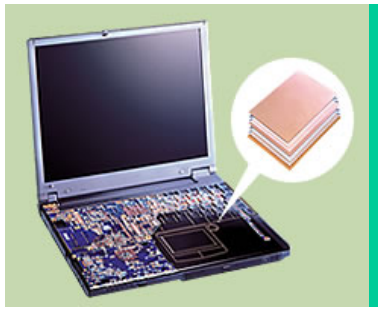
Main Products of PEW



Lighting Products

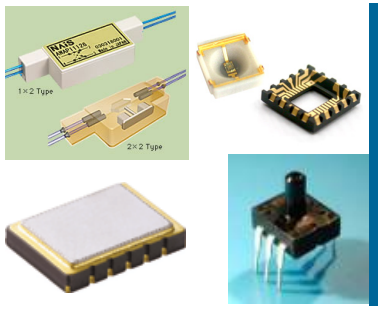
Building Products

Information Equipment & Wiring Products



Electronic & Plastic Materials

Home Appliances (Personal use)

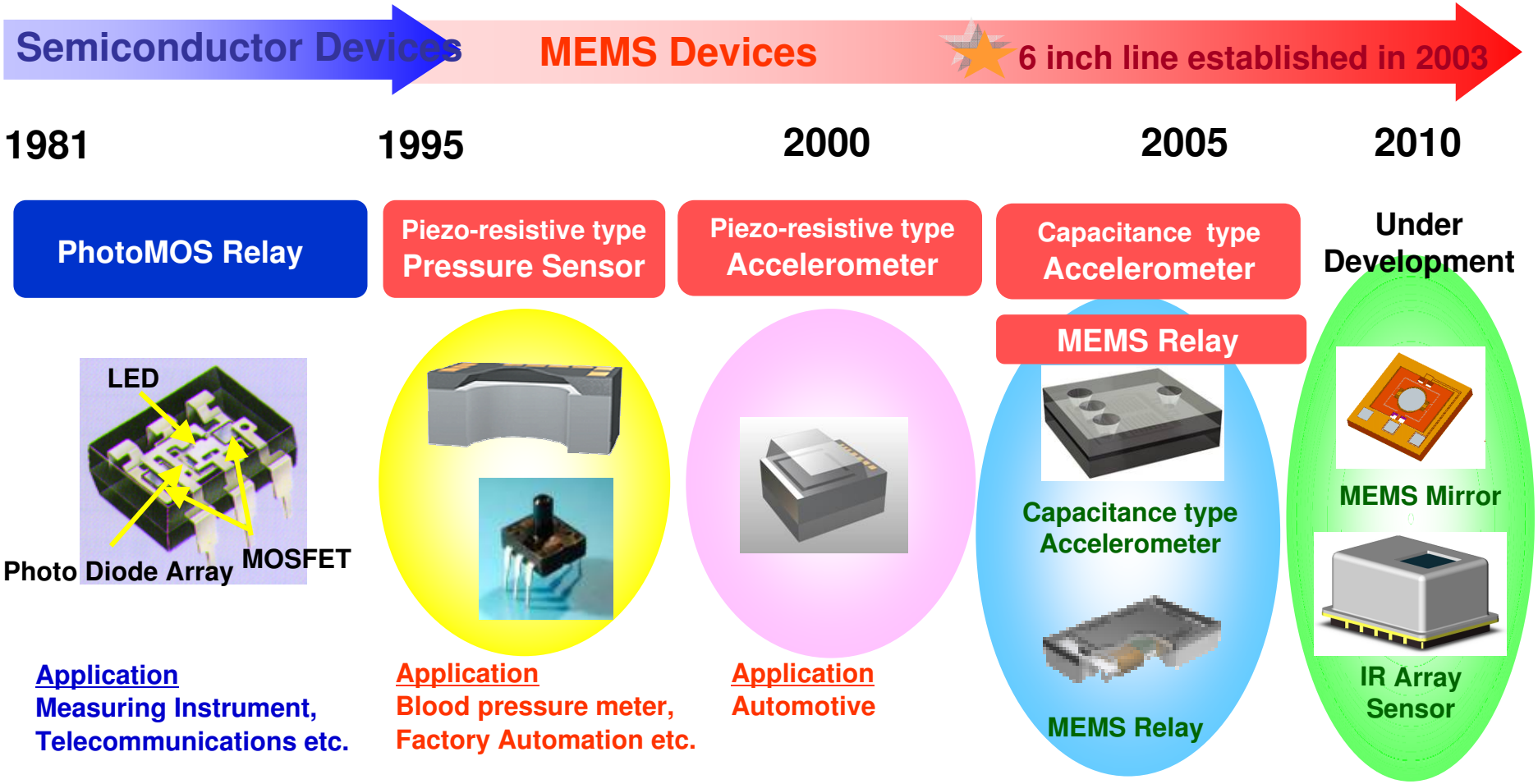


Automation Controls products

Contents

History of MEMS Device Development

In 1981, a first semiconductor relay was launched in Japan.
In 1995, MEMS R&D started. A pressure sensor was commercialized.



Location for MEMS development and production

Micro fabrication Process
Development Center in Osaka
（4 to 6 inch lines）

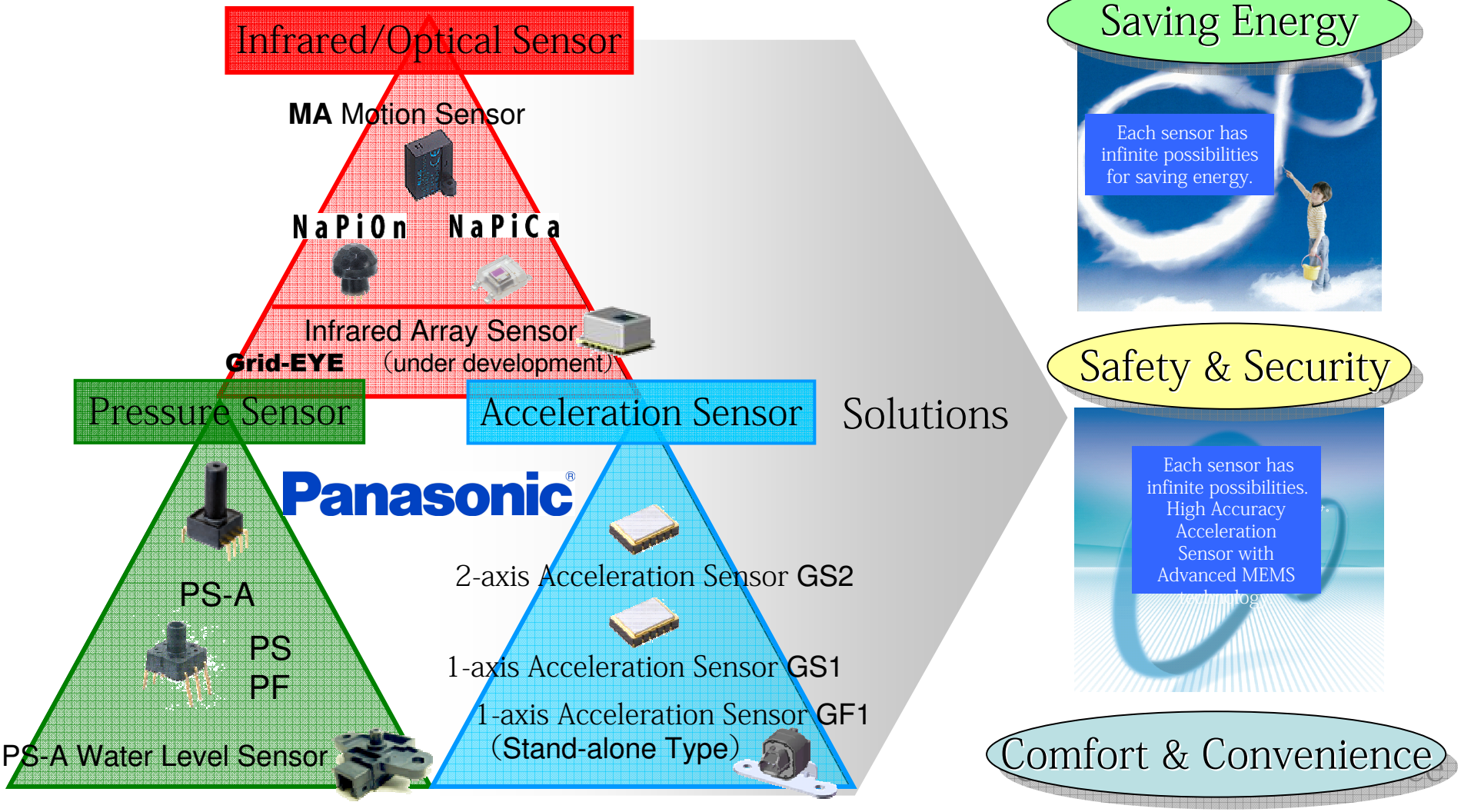
Ise Plant in Mie Pref.
（6 inch lines）

1200m² × 2 floors

- Company Profile
- Outline of MEMS Activities
- Newly Developed MEMS Developments
  - Infrared Array Sensor “Grid-EYE”
- Summary

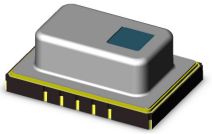
「PEW's Appliance Sensor」

We offer Solutions to Market Needs in total



Infrared Sensors

- Infrared sensor
  - Passive
    - Thermal
      - **Thermoelectric force**
        - <Element> : Thermopile
        - <Detecting concept> : Absolute Temperature
      - Pyroelectric
        - <Element> : LiTa03, PZT
        - <Detecting concept> : Temperature change
    - Quantum
      - Photo diode, Photo IC, CdS cell
  - Active
    - Area reflective
      - **MA Motion sensor**



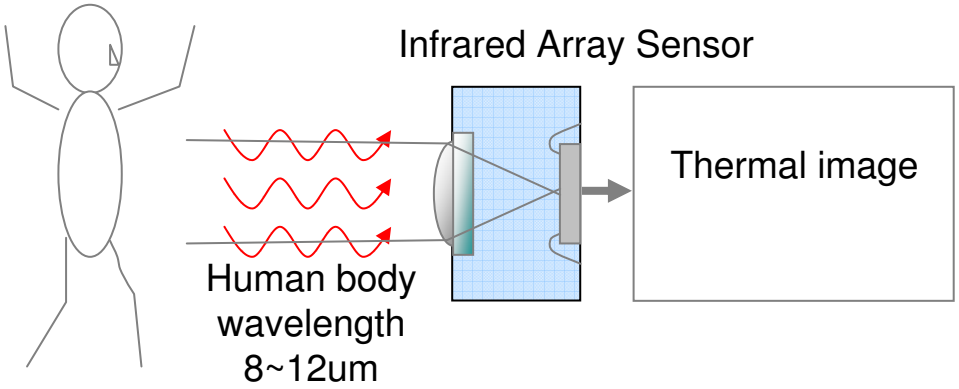
Grid-EYE

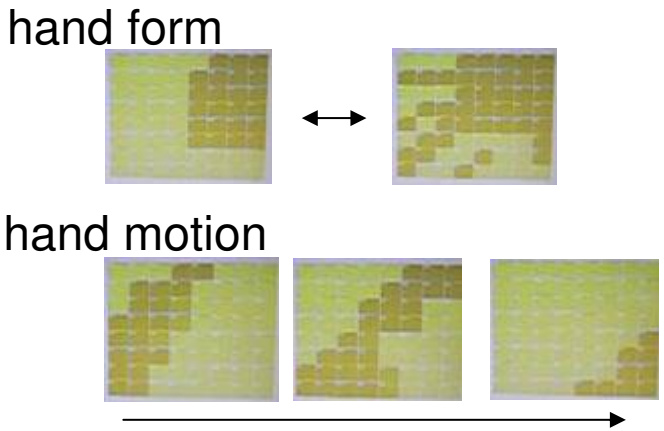
NaPiOn

What is an Infrared Array Sensor?

Fundamental Usage

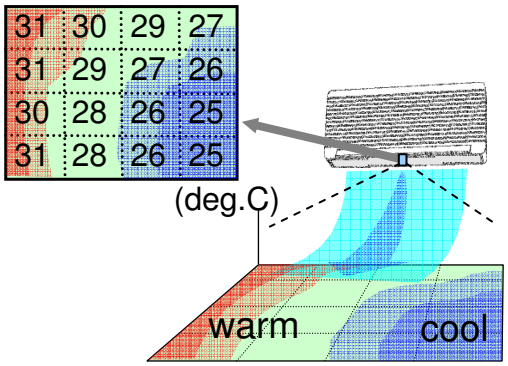
Detection of human position, attitude and motion to operate equipments



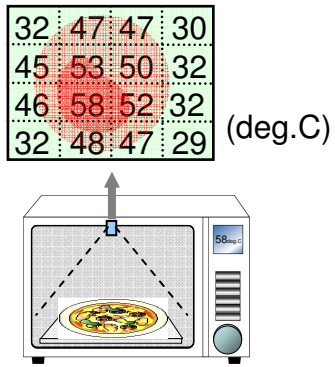


Detection of temperature distribution for optimal temperature control

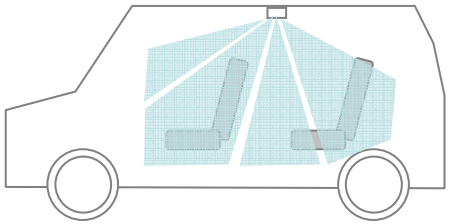
Air conditioner for room



Microwave oven

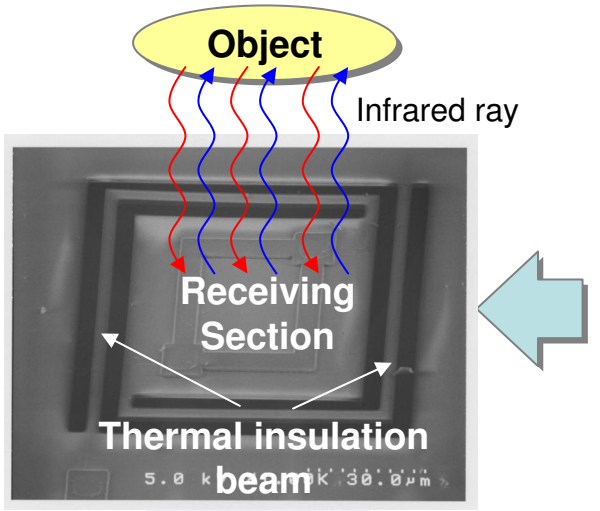


Air conditioner for automobile



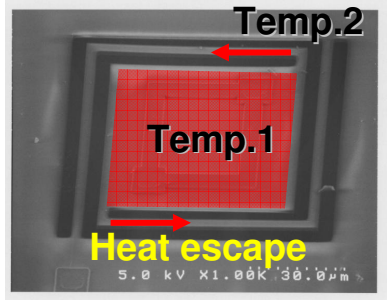
Detection principle

“ MEMS Thermopile” (detecting the absolute infrared energy)



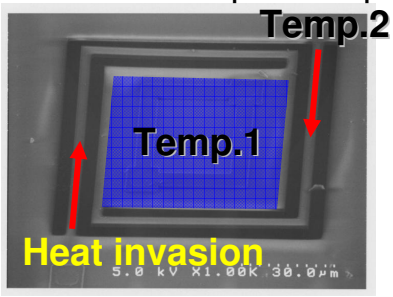
High heat influx

Heat escape from the insulation beam is small, so that receiving section tend to rise temperature.

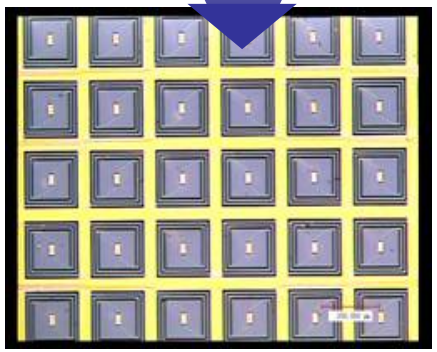


High heat radiation

Heat invasion through the insulation beam is small, so that receiving section tend to drop in temperature.

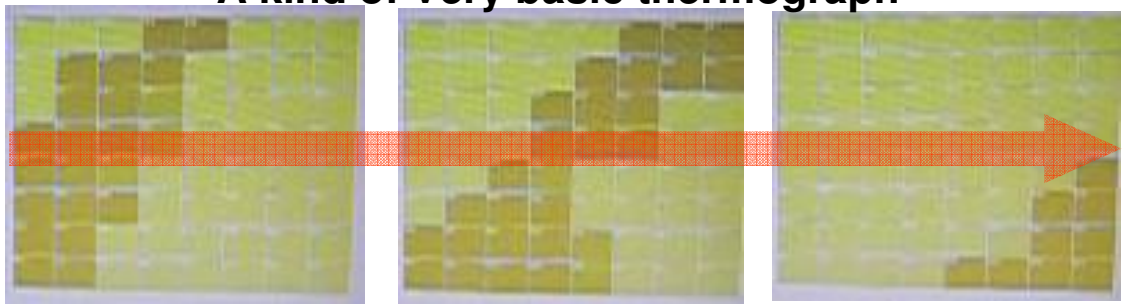


Operating condition of the object is sensed as thermal image.



<Grid-like array>

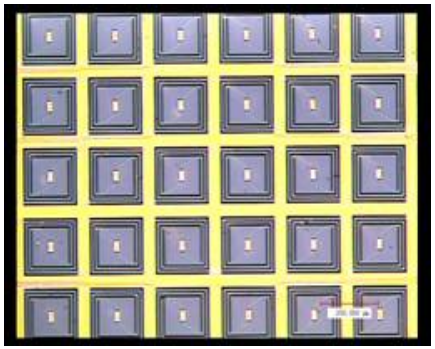
“A kind of Very basic thermograph”



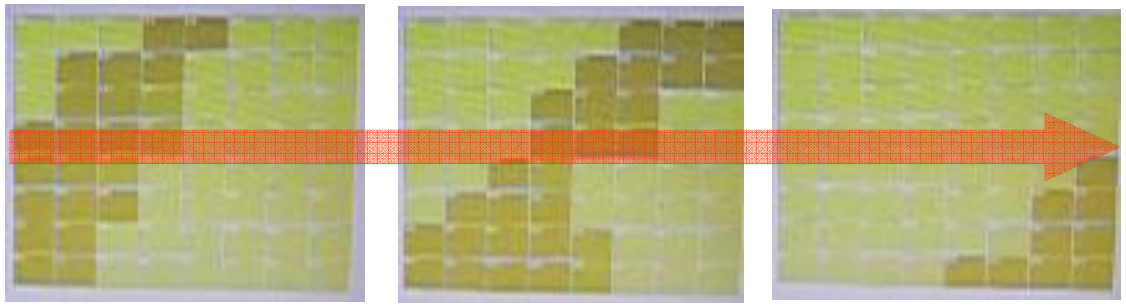
<Detect temperature distribution>

New Applications

Type \ Detection	Moving object	Motionless object	Moving direction	Thermal image
Pyroelectric	Possible	Impossible	Impossible	Impossible
Thermopile (Single element)	Possible	Possible	Impossible	Impossible
IR array Sensor Grid-EYE	Possible	Possible	Possible	Possible



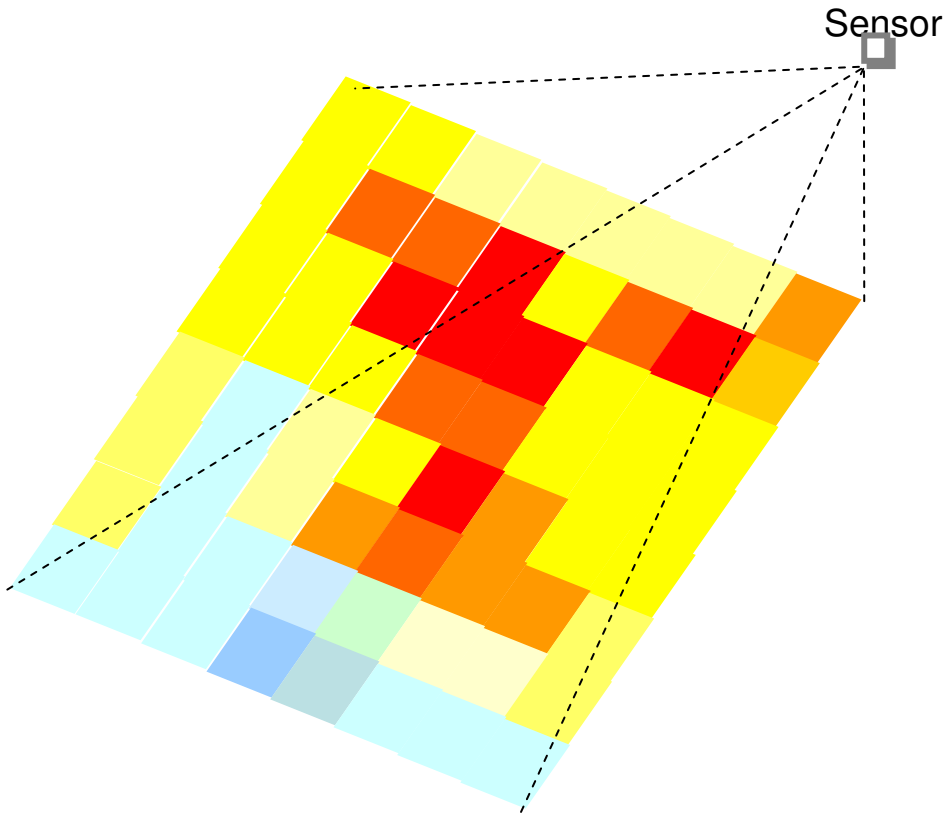
Object is sensed as a thermal image (temperature distribution)



New Sensing Options

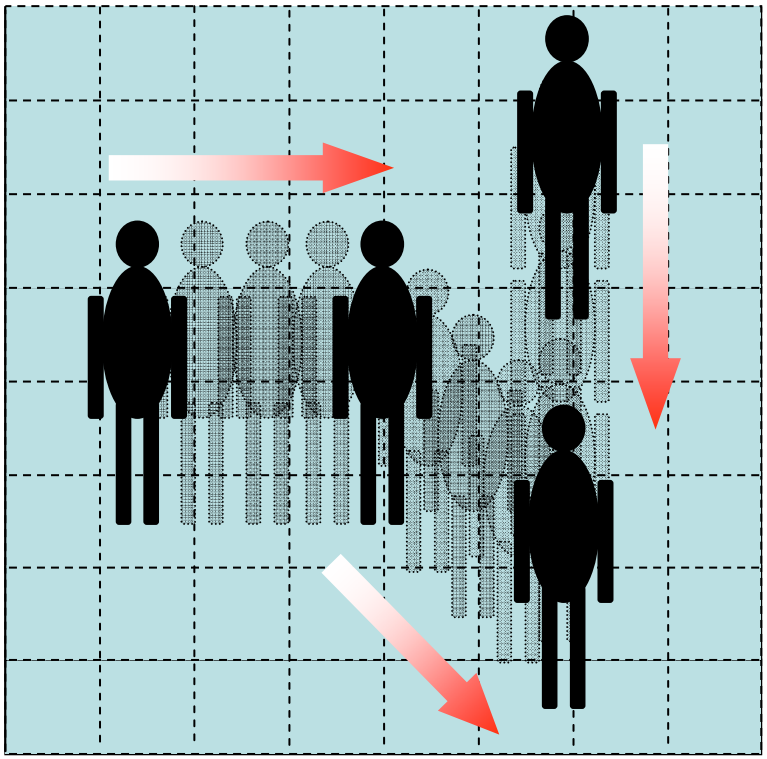
Temperature measuring

- **Multiple elements measure the temperature of each area**



Detecting motion / presence

- **Detect movement direction: up / down, right / left, sideways**
- **Motionless detection**

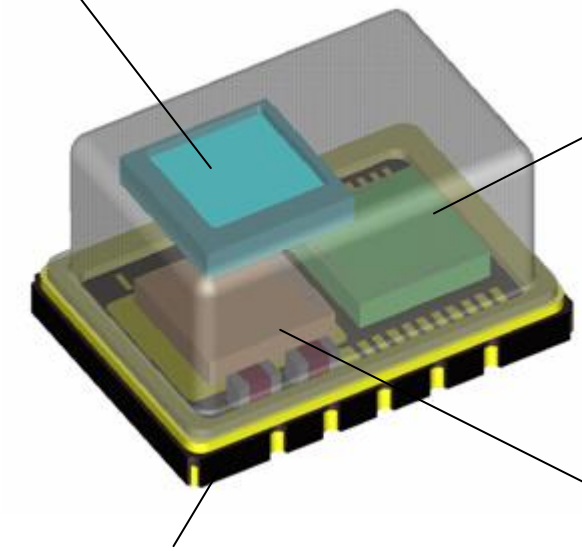


Component parts and its functions

Silicon lens

- Image formation

Grid-EYE



Mixed signal processing IC

- 64-Pixels signal readout
- Analog amplification
- Analog to Digital conversion
- Sensitivity correction
- Correction for temperature effects
- Digital communication

IR detector

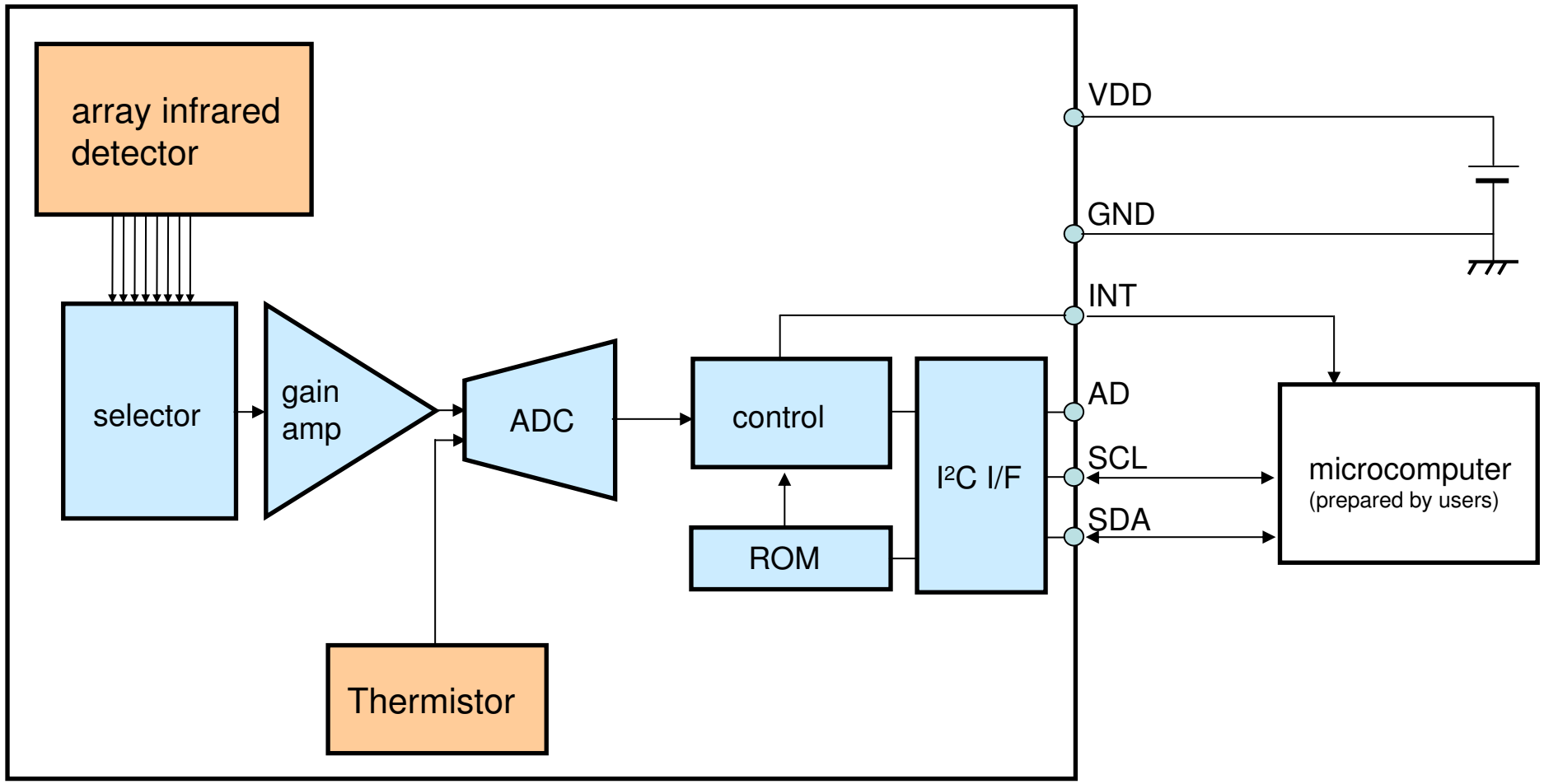
- 8 x 8 pixels
- Thermal insulation structure using MEMS technology
- Infrared absorption
- Thermoelectric conversion

Ceramic package

- Air tightness
- Radio shielding

Block Diagram

Infrared array sensor "Grid-EYE"



Summary

We have consistently developed our MEMS sensors and for the Infrared Array Sensor “Grid-EYE” we are utilizing micromachining technologies as a core technology.

MEMS … Micro Electro Mechanical Systems

Thank you for your attention!