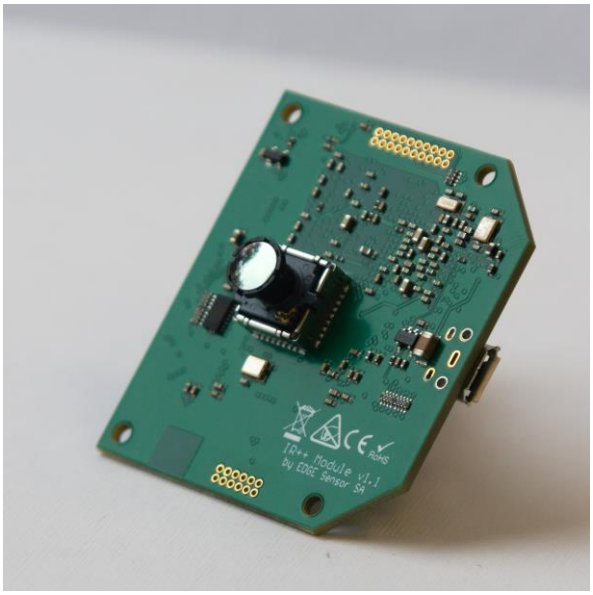
IR++ Module based on FLIR Lepton®
Detect, Count, Localize People in Full Privacy

The **IR++ Module** offers to Smart Building OEMs the capability to integrate the most **robust people counting and people positioning functionalities** in their sensor. It detects people position from thermal signature in **full privacy**, in **any light conditions** and with **large area coverage (8mX8m) from ceiling mount**. All processing is done in the module, at the "edge", optimizing the communication to the server/cloud.

The IR++ Module

- is delivered fully tested and loaded with upgradable PeopleIR firmware for easy integration of the people sensing capabilities into OEMs sensor.
- has several options to interface to a main board or a communication board in the sensor.
- can be configured or updated through UART
- outputs through UART JSON Metadata Packet including the occupancy status, the occupancy per zone, people count, people position, …
- communicates with uC through UART API for configuration, status, results.
- includes embedded WEB GUI with REST API and MQTT interface.

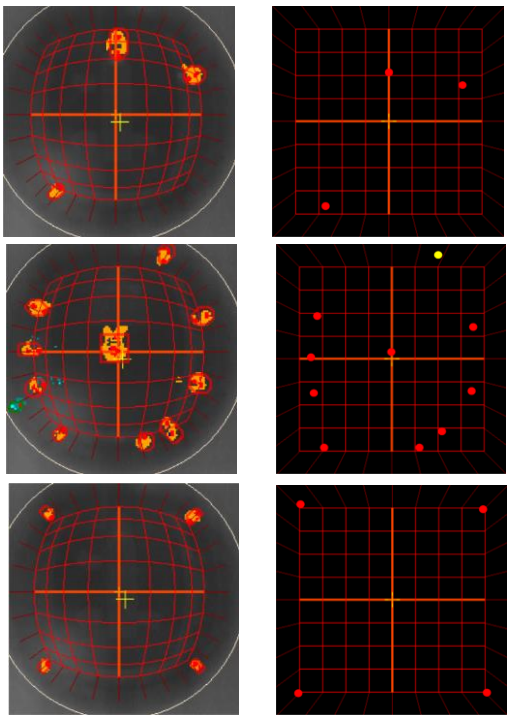


SMART Building Applications:

- ***Energy Efficiency Management***
- ***Dynamic Space Management***
- ***Service Level Management***
- ***Worker well-being and safety Mgnt***
- ***Space utilization Analysis***
- ***Audio-Video Conf. Optimization***

Internal analysis in the Module

Positions reporting to server/cloud



Grid: 8mX8m, each square is 1mX1m

IR++ Module based on FLIR Lepton®
Detect, Count, Localize People in Full Privacy

Technical advantages of EDGE Sensor technology and products:

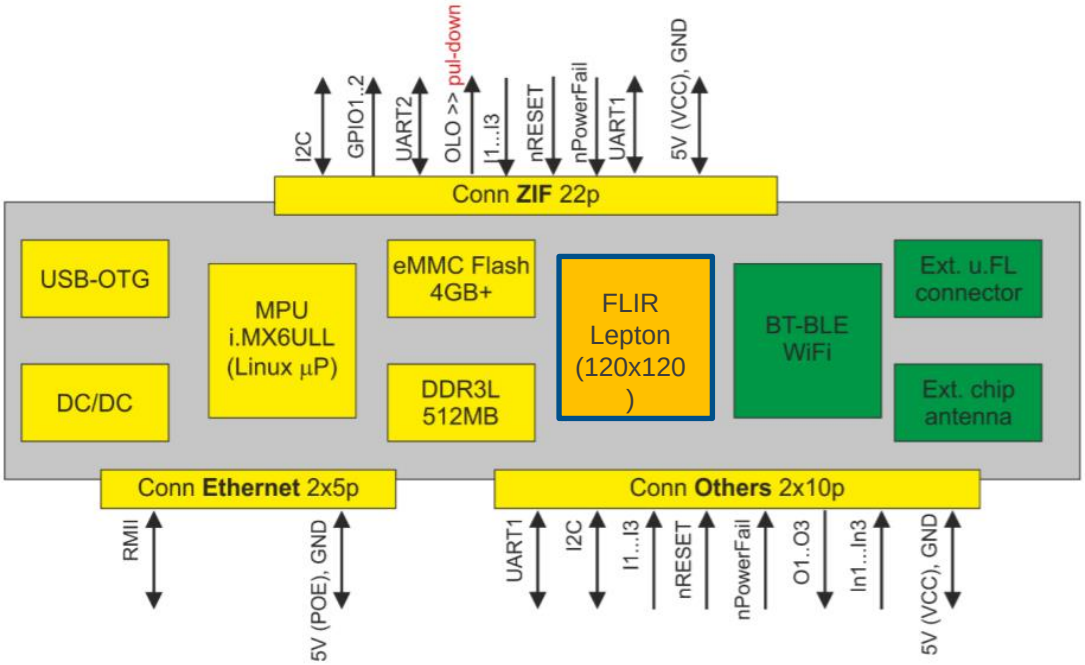
- ✓ Offering **simple** and **one-fit-all** fully tested module running Linux and EDGE Sensor PeopleIR Firmware with high flexibitity on connections to main board and large set of metadata options.
- ✓ **Highest robustness people sensing** thanks to FLIR Lepton 14,400 bolometers resolution detecting people from temperature signature
- ✓ **Great coverage** with a 64m2 area monitoring (8mx8m) from 2.5m – 4m ceiling mount.
- ✓ **Simplified commissioning** by just setting the mounting height. No needs to mask windows, screen, …
- ✓ Full control of the **shape to monitor** thanks to exclusion-zones and sub-zones options.
- ✓ **Very high immunity to artifacts** thanks to robust thermal signature of people completely independent of light level (operation in full darkness) or light variation or moving object.
- ✓ People Sensing in **full privacy,** all processing is done on the module based on thermal footprint signal. Only metadata (position, count, …) are send outside the module Even in case of "hack" of the module, the thermal footprint processing inside the module does not allow people recognition or private information extraction. The sensing part can be hidden behind plastic film in the sensor and this sensing part does not look like a lens.

Module Part Numbers:
Standard:
ES16Y2_792C-256R_04GE_0SF_ES
With BT-BLE and WiFi:
ES16Y2_792C-256R_04GE_1SF_ES
Evaluation Kit:
ES_IR++_Ceiling_Eval_kit_2
Custom: *Option for License of IR ++ Reference Design and PeopleIR Firmware*

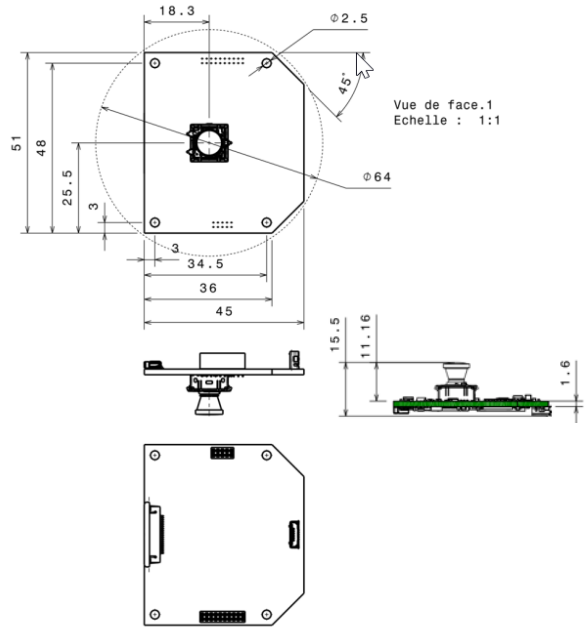
IR++ Module HW	
Sizes	51mm/45mm/15.4mm
Power Supply	4.5v - 5.5v
Consumption (active)	500mW (up to 800mW)
Consumptiopn (idle)	80-300mW
Ambiant operation temperature range	0-45degC
UART and IO	3.3V
Nbr UARTs	2
Nbr I2C	1
Nbr Inputs	5
Nbr Outputs	4 (including fast Light Control output)
RMII (Ethernet)	1
USB	1
Wireless (optional)	BT-BLE & WiFi
Communication	UART, REST API, MQTT
Compliance	Pre-compliance tests
IR++ Module PeopleIR Firmware	
Operating System	Linux
Firmware	EDGE Sensor PeopleIR
Mounting Height	2.5 – 4.0m
Area Coverage	Up to 64m2
People Position precision	+/- 50cm
People Distance differentiation capability	0.75m radius (can vary with occlusion and overlap)
Max People Count	32
Nbr of Sub-zones	Up to 8
Nbr Exclusions-zones	Up to 4
Vacant to Occupied	<250mS
Occupied to Vacant	Configurable as use cases dependant (5s-12min)
People Count and position reporting update	configurable (5s default)

IR++ Module for Smart Building
Detect, Count, Localize People
in Full Privacy

IR++ Module Block Diagram



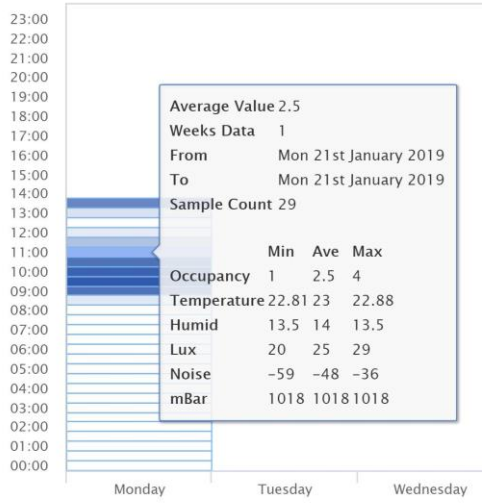

```
{
"metadata": {
"zonesLocation": [
    [[-400,-400],[400,400]],
    [[200,200],[300,300]]
                ],
"zonesExcludeLocation": [
    [[-400,-400],[-350,-350]],
    [[200,200],[210,210]]
    ],
"grid": [800, 800]
    },
"value": {
    "occupancy": true,
    "peopleCount": 2,
    "occupantsLocation": [
        {
        "locationXYZ": [-126.0,104.6,126]
        },{
        "locationXYZ": [-130.5,102.2,140]
        }
    ],
```

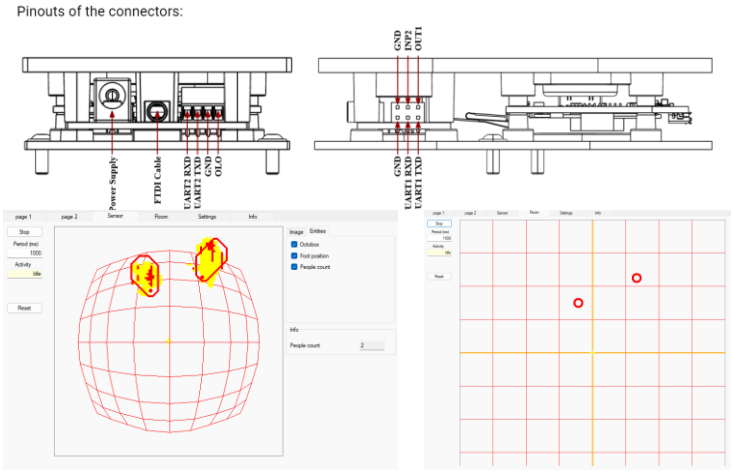
IR++ Module based on FLIR Lepton®
Detect, Count, Localize People in Full Privacy

Application examples:

- Light Control: Optimum Occupied/Vacant with configurable Exclusion zones
- Vent and HVAC control: Occupancy level for optimum control, level of activity.
- Realtime room and workstation reservation management: room or sub-zones (workstation) Occupancy or Vacancy reporting.
- Realtime meeting room reservation and capacity efficiency usage monitoring
- Service level management: room or sub-zones occupancy history for optimum service/maintenance management
- Statistical analysis of office, open-space, area usage: “heatmap” for surface utilization statistic over long periods.
- Realtime people position for Audio/Video conferencing optimization: Head position tracking



People IR++ Evaluation kit including WiFi embedded WEB GUI with REST API and MQTT interface.



EDGE Sensor SA
Jaquet-Droz 1; CH-2000 Neuchâtel, Switzerland
www.edgesensor.ch
info@edgesensor.ch