intelar
Light by motion

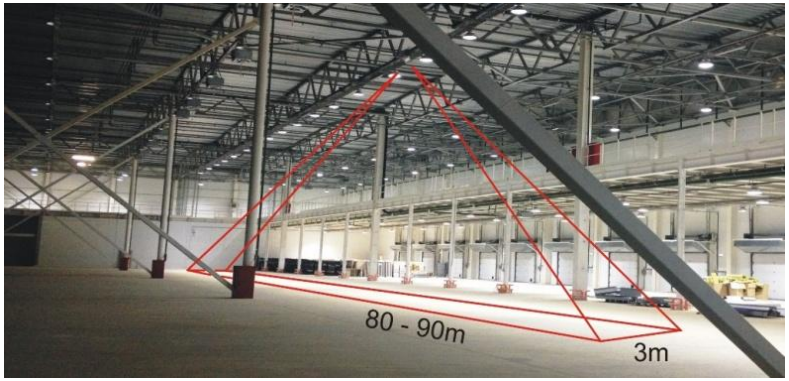
Long-range occupancy sensor for lighting control and automation warehouses, urban and industrial buildings and territories

UN Sustainable Development Goals

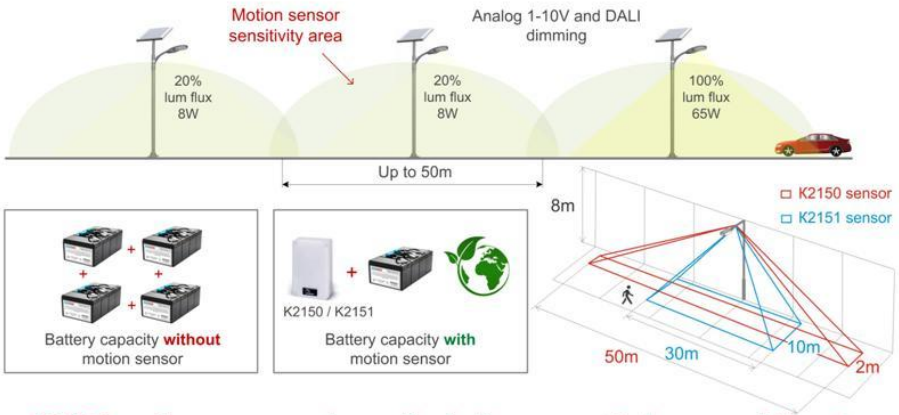
Cost-effective technology with a short payback period

K2150 occupancy detector overview

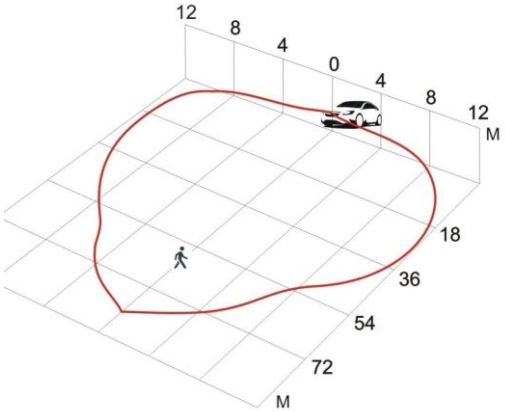
Can be used in:



- Lighting control and automation systems
- Autonomous solar lighting systems – light by motion
- IoT systems
- Smart manufacturing, Smart City
- Car2X
- As a long-range **low-cost** automotive radar sensor



K2150 motion sensor reduces the battery capacity by several times!



The sensor is ideal for warehouse lighting control

Case Study: Lighting control system for a warehouses

The Challenges

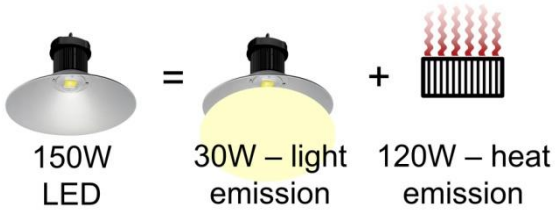
- Most warehouses of old construction are not equipped with presence sensors. They consume about **3 times more energy** than warehouses with automation

- The sensors available on the market have a maximum installation height of **12 m**. VNA-warehouses up to 22 m high are becoming popular now

- Sensors offered on the market now:
  - do not operate in **freezing** and **high humidity** warehouses (storage of vegetables, fruits…)
  - cannot operate steadily in warehouses located in regions **with warm and hot climates** in summer

Case Study: Lighting control system for a warehouses

Why electric energy gets wasted twice in freezing warehouses?

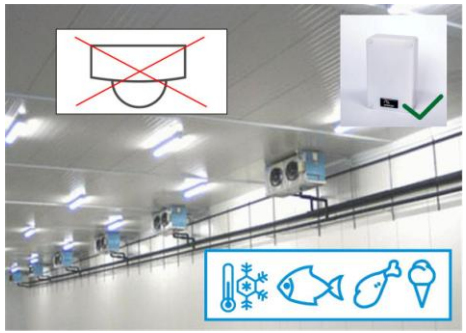


150W light fixture = 120W heater (150W x 0.8 = 120W)!

100 pcs 150W light fixtures = 12kW heater and the cooling system of the warehouse must always compensate those parasite heat emissions.

+12kW heating – 12kW cooling = 0. Waste 24kW. Every hour!

In such a way, electric energy gets **wasted twice** – firstly, on the air heating by fixtures, secondly, on its cooling!



Why PIR-sensors can't operate in freezing warehouses?

Infrared motion sensors (PIR) are optical sensors with focusing lenses. In freezer warehouses lenses get covered by frost and the sensor **can no longer detect any motions.**

Case Study: Lighting control system for a warehouses

What the result could we have?

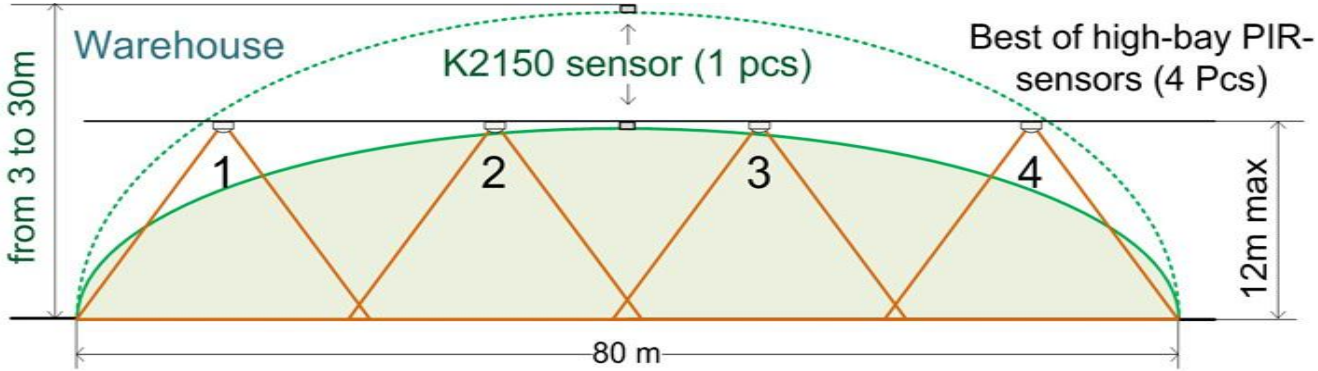
Before

After

- Energy savings in warehouses lighting systems can reach up to **80%!**
- Even if you have energy efficient LED-light sources installed, we can reduce your energy costs **several times more**!

Solving the problem

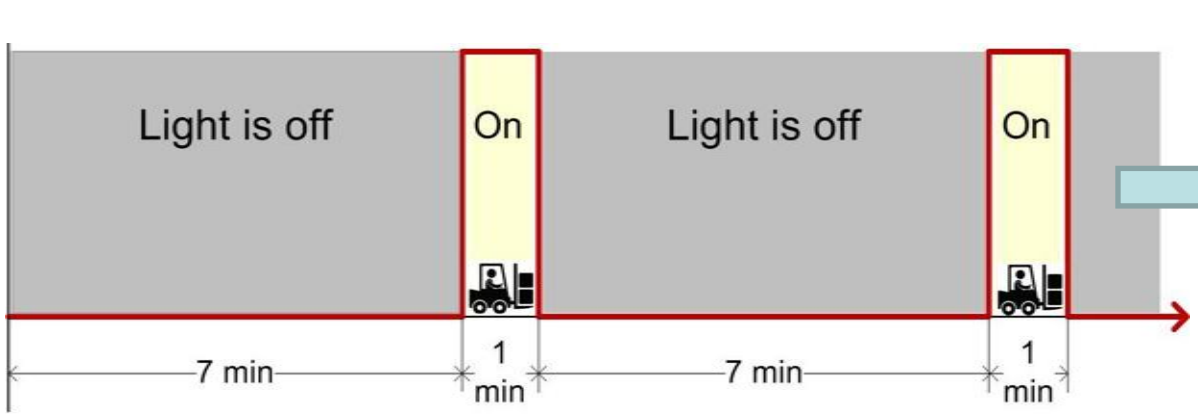
K2150 vs Competitors

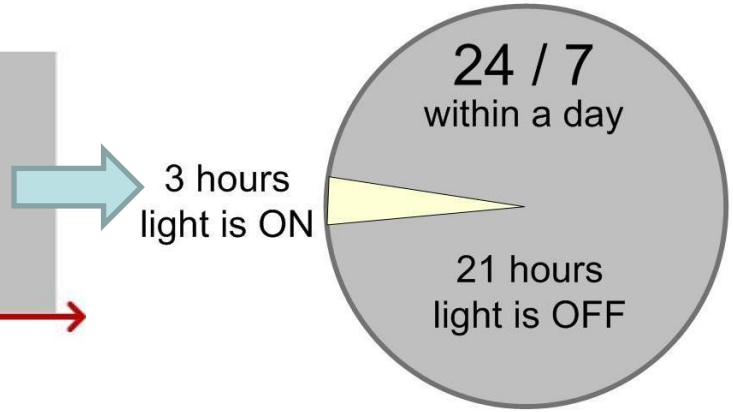


- One sensor controls an inter-rack aisle up to **85m** long (detection of humans) and up to **115 m** long (detection of vehicles) - real cases!
- K2150 replaces 4 high-bay sensors of the **world's best manufacturers**!
- No competitors in warehouses with a height of more than 14m

Case Study: Lighting control system for a warehouses

Why is it cost-effective to manage lighting in warehouses?





One sensor saves up to **10 000 kWh** electric power and decrease emissions of CO2 in atmosphere on **4 tones** per year

- Reduces the energy consumption of the lighting system by 3-4 times!
- The payback period is approximately 1 year. Best result – 6.5 months!

Feedback from PepsiCo

PEPSICO INTERNATIONAL

Wimm-Bill-Dann Joint Stock Company
(PepsiCo Group)

Dmitrovskoe highway, 108, 127591 Moscow
+74957458080 www.pepsico.com

To CEO of Intelar LLC
Victor Verbovsky

Equipment operation feedback

17 units of Presence Sensors for automatic control of warehouse lighting K2150, produced by Intelar LLC, were implemented into dairy products cooling warehouse of PepsiCo Wimm-Bill-Dann Lianozovo

Sensors were used under such conditions:
- Ambient temperature of +4°C;
- Sensor's installation height of 15 meters;
- Each sensor controls an inter-rack aisle 65 meters long.

In the time period of two and a half years of K2150 sensor exploitation, not a single failure occurred.
Despite the impressive installation height of 15 meters, sensor reliably detects any human or vehicle presence in its area.
Exploitation of K2150 sensor is convenient and easy as it does not require any additional service.
Economic achievements of automatic lighting system of warehouse (17 aisles, S=5600 sq m):
- Energy consumption of lighting system was reduced by 2.8 times;
- Electrical energy savings in year for the entire warehouse is 185 000 kW*h, for each installed sensor it is 10 800 kW*h;
- Payback period considering the payment of 0.03 Eu/kW*h (0.04 USD/kW*h) is 18 months.

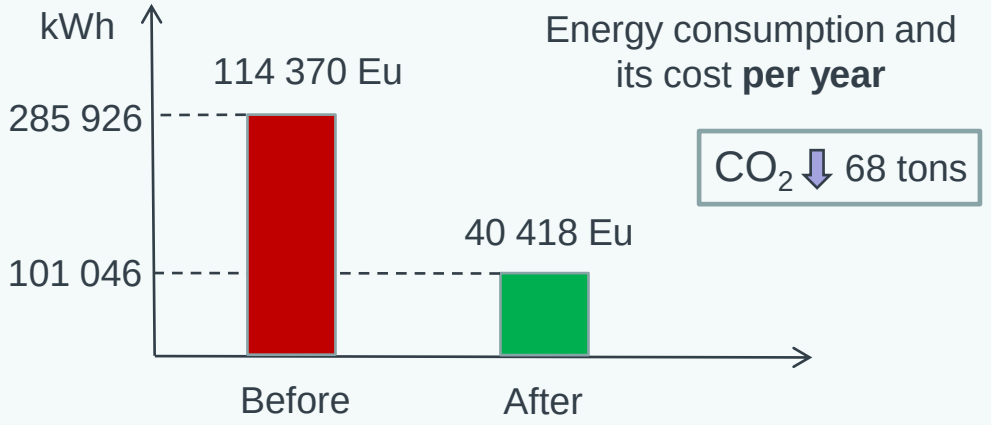
Head of power department PepsiCo Wimm-Bill-Dann Lianozovo

Anton Vydrin
Date: 17.06.2021г.

PEPSICO

Economic achievements of automatic lighting system of warehouse (**17 aisles**, **S=5600 sq m**)

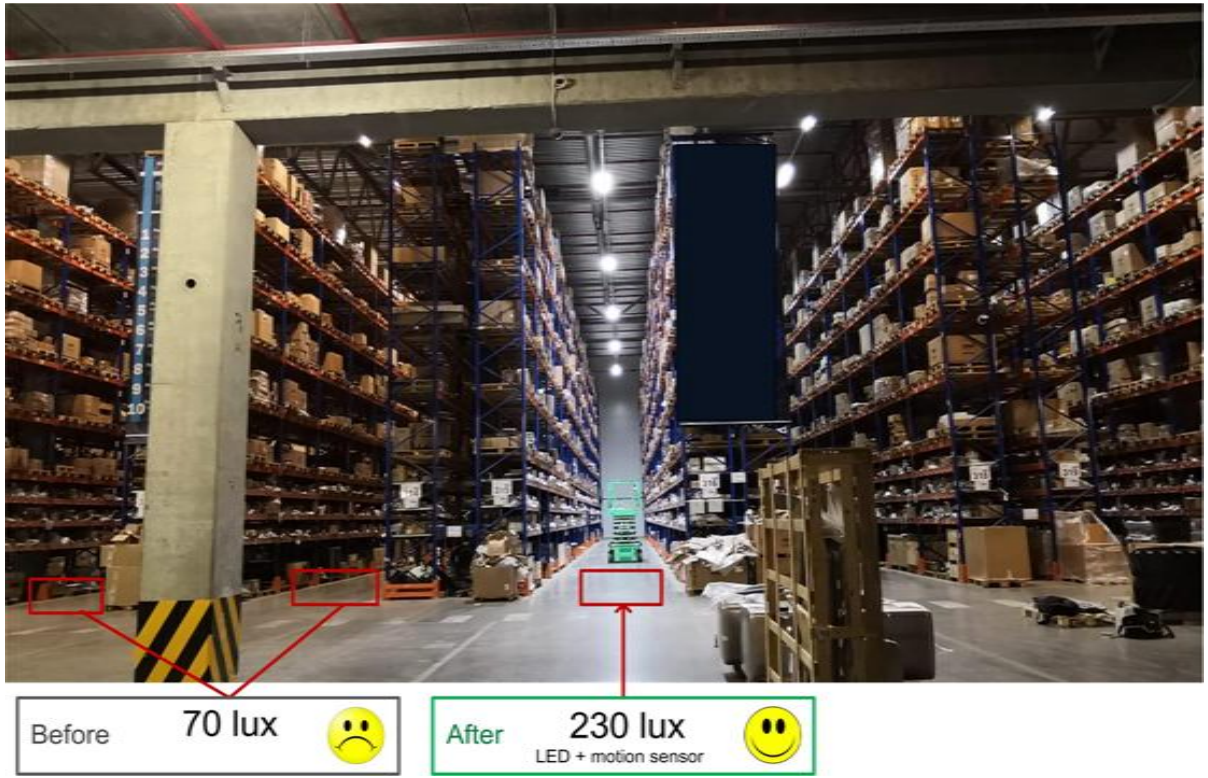
- ✓ Sensor's installation height - 15 meters
- ✓ Each sensor controls an inter-rack aisle 65 meters long



Savings - 184 880 kWh / 73 952 Eu * / ⇩ 2.8 times

* - taking into account the price of energy 0.4 Eu/kWh

Case Study: Lighting control system for a warehouse



Challenge: How to increase energy efficiency in warehouses with already installed energy efficient lighting fixtures (luminescent with T5 104 lm/W lamp)?

Warehouse of the company Ghelamco, Belgium

Case Study: Lighting control system for a warehouse

Test at the warehouse

Before:

- Type of light fixtures – **luminescent T5**
- Number of light fixtures – **14**
- Fixture power – **80W**
- Total power of one alley – **1120W**

Electricity consumption per 6 months - **4420** kW*h

After:

- Type of light fixtures – **LED**
- Number of light fixtures – **6**
- Fixture power – **121W**
- Total power of one alley – **726W**

Electricity consumption per 6 months with motion sensor (1,5+3,7) **- 847** kW*h

Energy consumption decreased **5.2 times.**
The light level increased **3 times!**

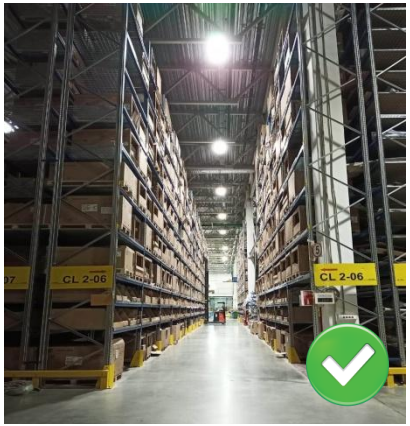
Market

Warehouses are the most profitable and fastest growing segment of the real estate market

Very-narrow-alleys warehouses (VNA) with a height up to 22m

719 000 000 m^3 refrigerated warehouse capacity in 51 countries!

Storage of vegetables and fruits (high humidity)



Conventional warehouses, 3-30m height

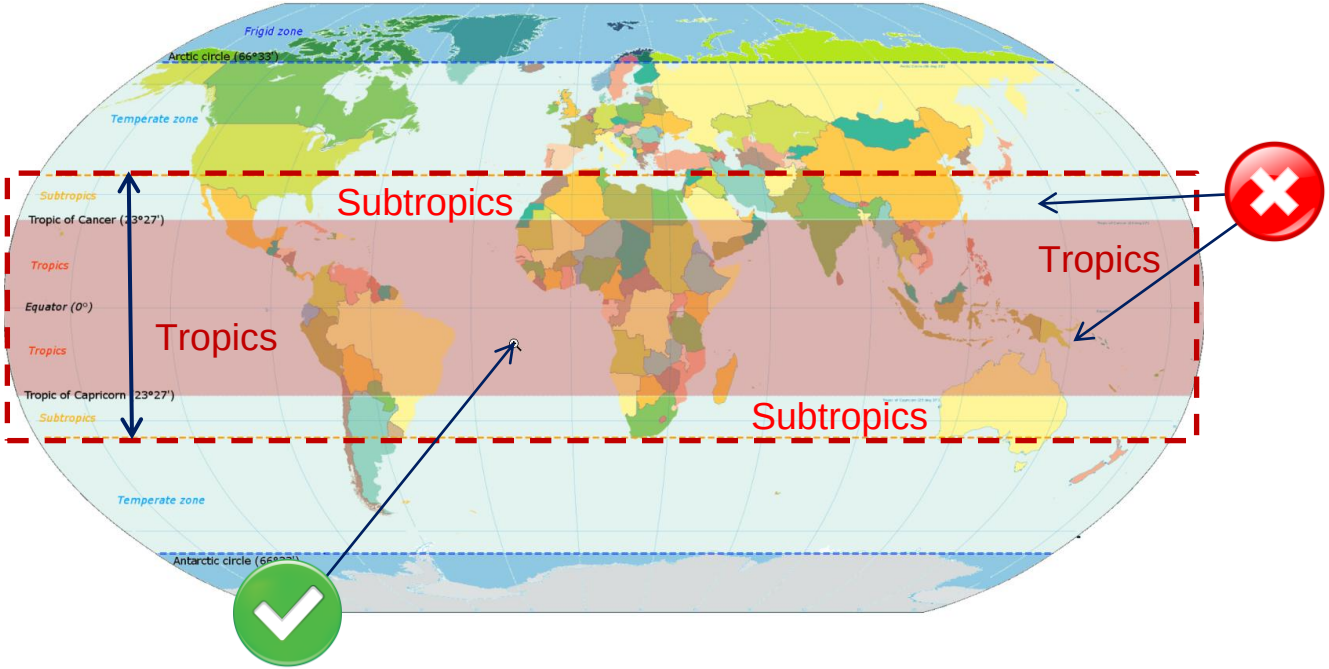
- Our market!

The sensor complies with the European Safety/Health standards

(EN 62311 2008, EN 62368-1 2014 + AC:2015)

Market

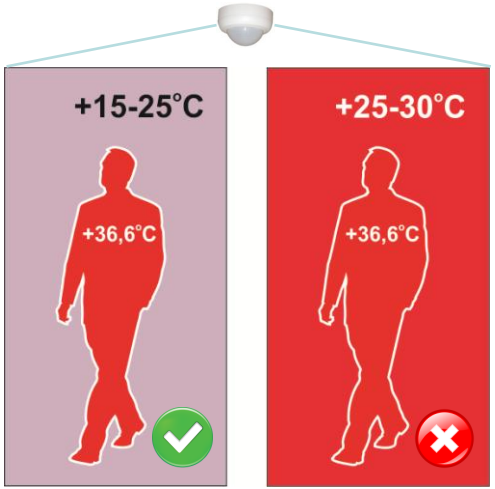
Market with significant advantages for our sensors



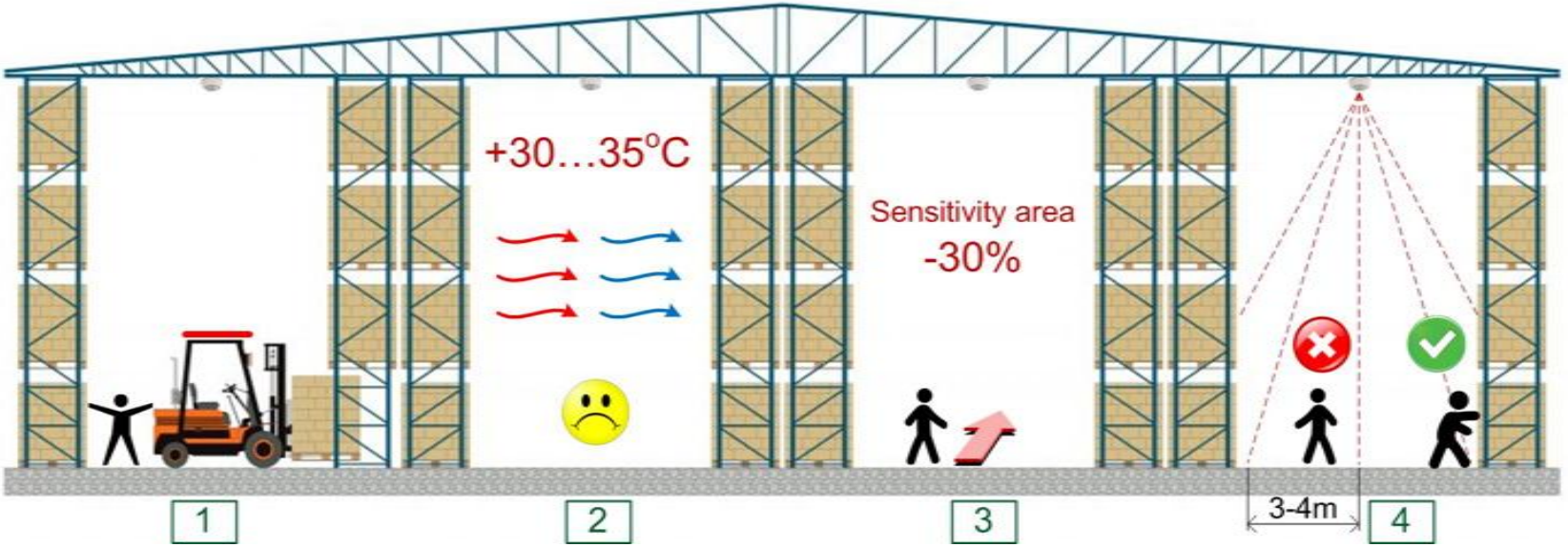
Our sensor uses radar motion detection technology, which doesn't depend on temperature, humidity and drafts

Why?

The PIR sensors of our competitors can't detect a person if the ambient temperature inside the warehouse is about +30°C



Main disadvantages of infrared motion sensors



React to the difference in the temperature, **not to the motion itself**

HVAC systems can cause **false triggering**. Hot weather might **halt** infrared motion sensor **operation**.

Have problems with movement directed to and from the sensor (**30% reduction of the coverage area**)

Have **dead zones of several meters** and therefore require a long off-time delay

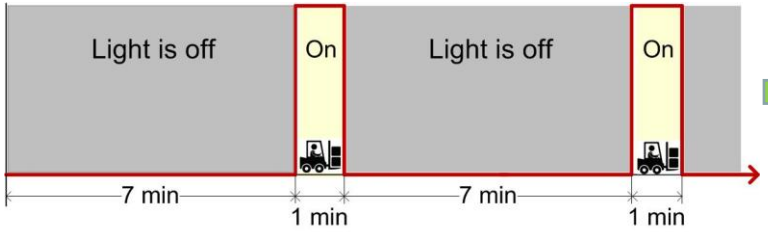
Competitors

How do competitors solve this problem?

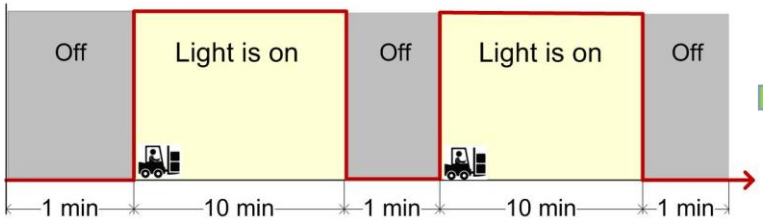
❖ If the height of the warehouse does not exceed 14m, they use a scheme with two sensors (PIR) – at the beginning and at the end of the alley + a long time delay (usually 10 minutes)

❖ No solutions, if the warehouse is higher than 14m

K2150



Competitors



And how profitable is such automation for a customer?

Saving 60-80%
Payback period 0.5 -1 year

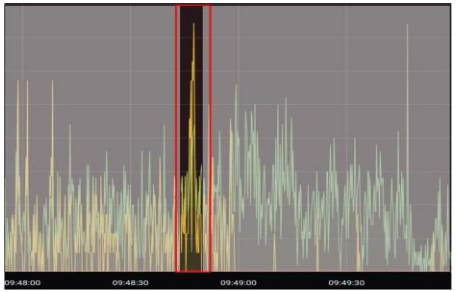
K2150

Saving 20-30%
Payback period 2 - 5 year
(the lighting would still working for 10 minutes in an empty alley)

Competitors

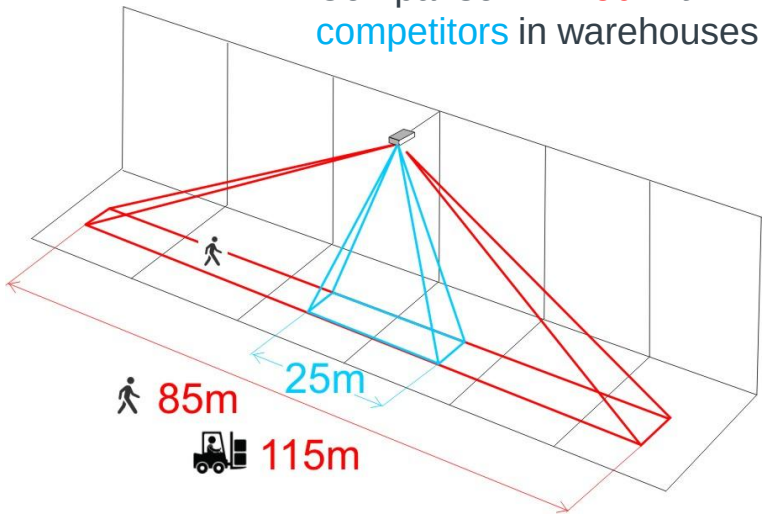
Technology

Our core advantages



Our know-how is a special mathematical signal processing inside sensor's microprocessor, that increases operation range from 25 meters up to 80 and even more

Comparison K2150 with competitors in warehouses



Progressive microwave-radar technology instead of passive infrared one

How motion sensor K2150 is different from its competitors

Characteristics	Competitors	K2150
Maximum installation height in the warehouses, m	12	30+
The length of the sensitivity zone in the warehouse alley, m	20	85
Sensitivity area, sq. m	120-400	3000
Relay output and smooth light dimming output in one sensor	No	Yes
Can be mounted on the wall and on the ceiling	No, only on the ceiling	Yes
Can be integrated with security alarm systems, IP-cameras, BMS, Automated Process Control Systems	No	Yes
Operating temperature	-10…+65 °C	-30…+65 °C
Can operate in cold storages -30*C	No	Yes
Can run directly from solar cells 12VDC, without converters	No	Yes
Enclosure protection	IP54	IP65, IP67
The payback period, in years	2 - 5	1

K2150 occupancy detector overview

Main benefits:

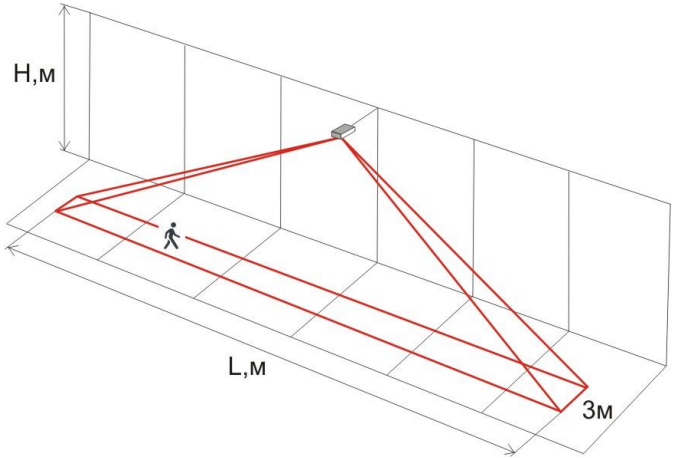
- Detects a person at a distance of **80m** on an area of **3000 sq.m**! ***
- Suitable for warehouses with a height of **3 to 30+ m! *****
- Remote setup via 2.4GHz radio
- Can be used in **cooling, freezing warehouses ***
- Can be used in special **high humidity warehouses ***
- Can reliably operates in warehouses located in **hot climate** regions
- Can be integrated with the security alarm system or IP-cameras
- All-weather design, small dimensions 125x80x40 mm
- Included in the portfolio of “1000 Solutions to Protect the Environment in a **profitable** way” of Solarimpulse Foundation, Switzerland.

* - the unique advantages for warehouses

K2150 sensitivity

Sensor’s sensitive area when installed on a ceiling

H, m	L, m
2.8 - 4.0	15.0 - 20.0
5.0	32.0
6.0	50.0
8.0 - 10.0	60.0 - 65.0
12.0 - 20.0	70.0 - 85.0



The length of the K2150 sensor’s sensitive area depends on the installation height H (person’s movement tracing!).

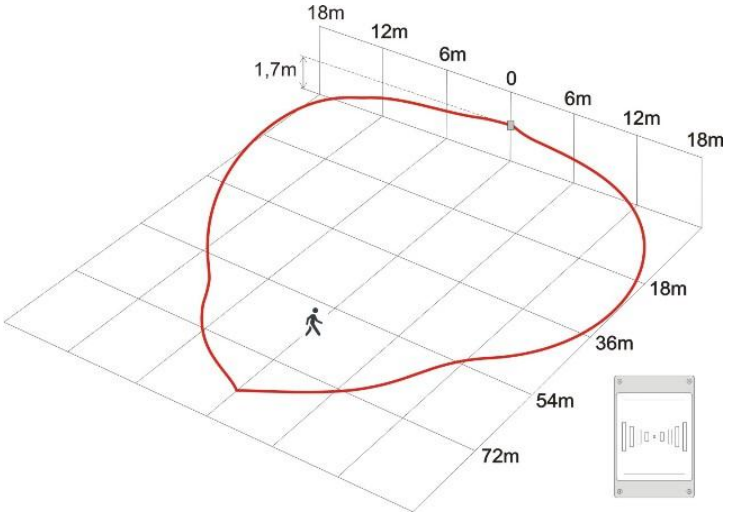
The best detection range results in warehouses:

❖ 2018: VNA warehouse with a height of 18m - one sensor in the aisle 84m long (human and loader detection) of the largest distributor of medicines Protek Group

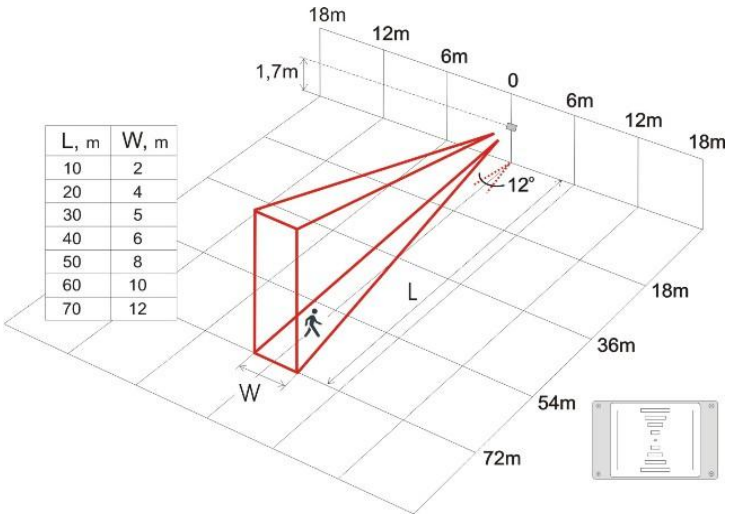
❖ 2018: VNA warehouse with a height of 15m - one sensor in the aisle 114m long (loader detection only) of a well-known logistics operator SVHouse

K2150 sensitivity

Sensor’s sensitive area when installed on a wall



The K2150 sensor’s sensitive area when **vertically installed on a wall**



L, m	W, m
10	2
20	4
30	5
40	6
50	8
60	10
70	12

The K2150 sensor’s sensitive area when **horizontally installed on a wall.**

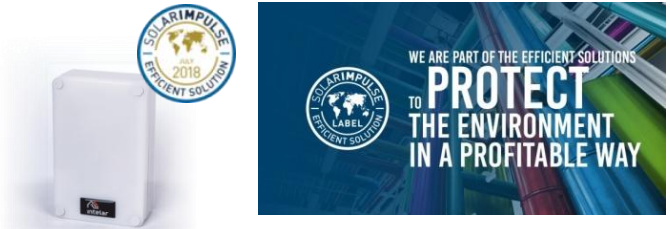
Results and achievements

- More than 40 successful projects
- High reliability. Not a single return for repairing for 3 years of selling!
- Repeated sales ~ 100%
- Our customers have saved **20** million kWh of electricity
- Reduced CO2 emissions by **8000** tons (400 g of CO2/kWh)

"Golden Mercury" in the nomination "The Best Innovation"

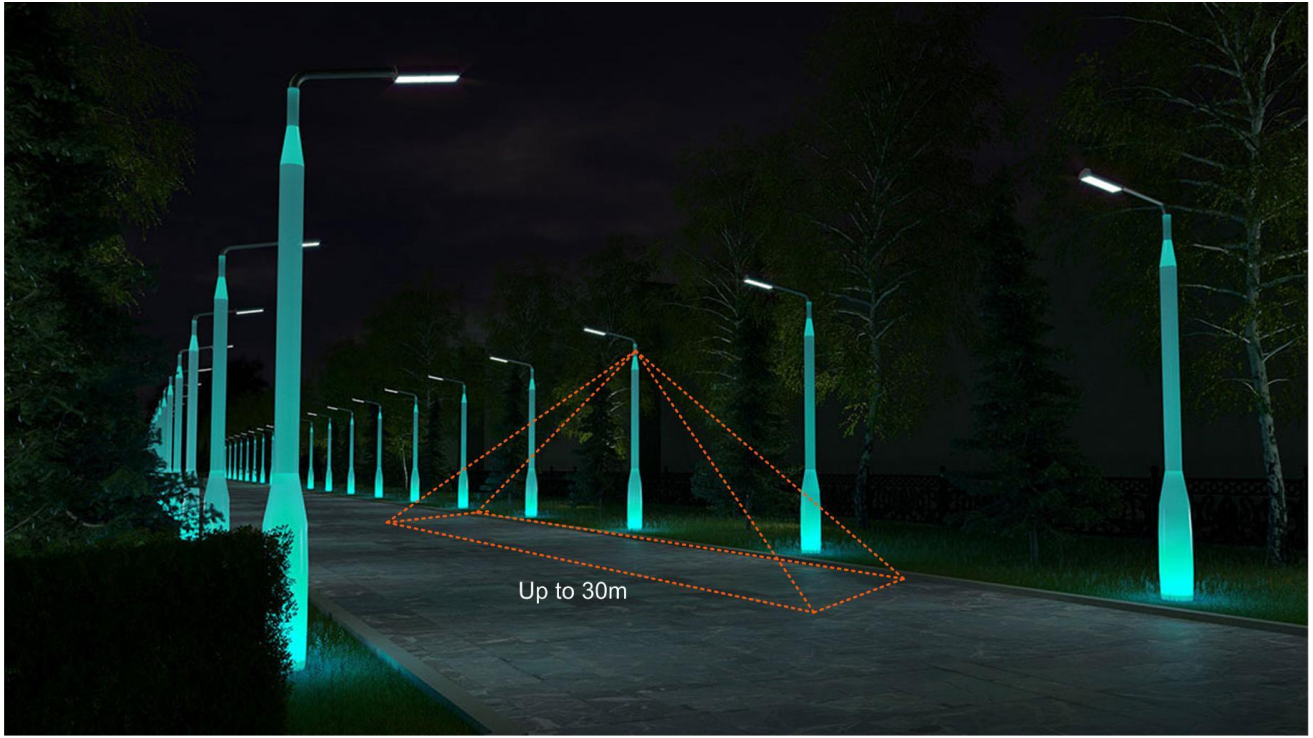
Munich, 2021

Lausanne, 2018



Since July 2018 the K2150 sensor has been labeled as World efficient solution from Solarimpulse Foundation, Switzerland

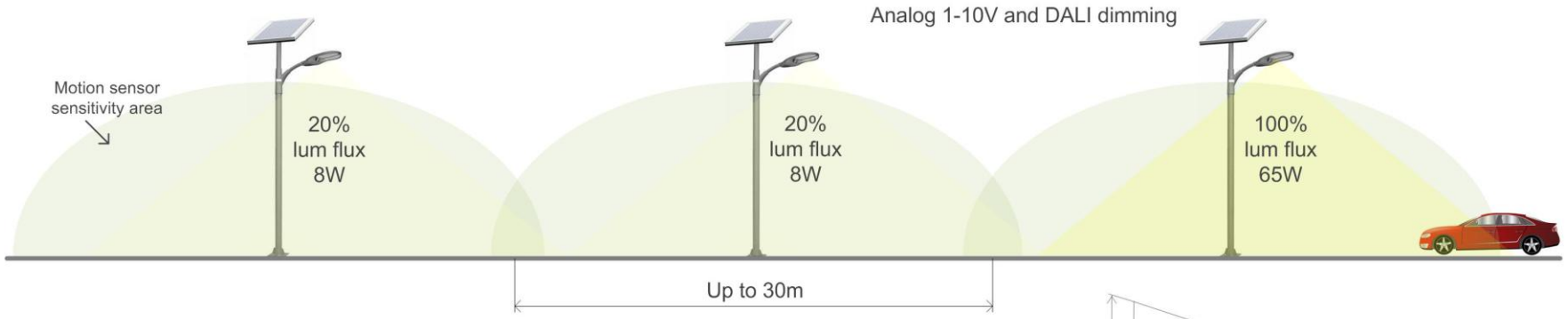
Autonomous solar lighting systems

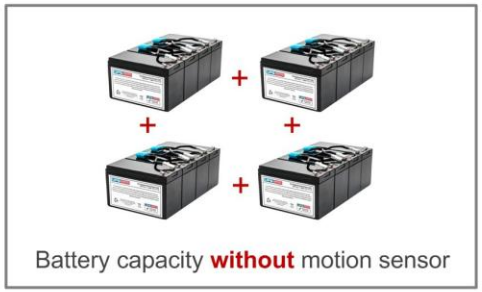


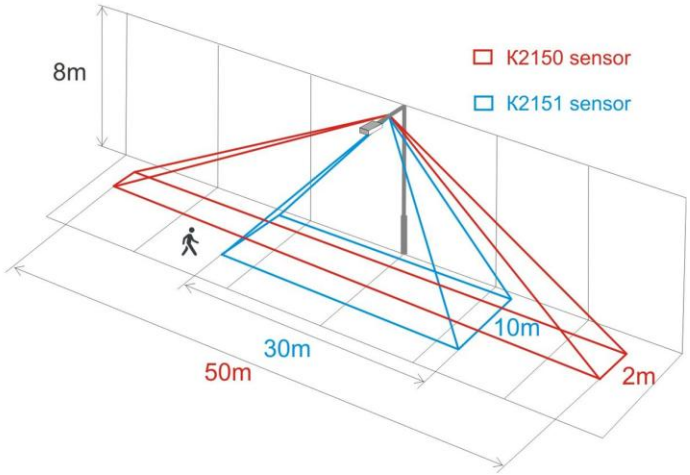
Autonomous solar lighting systems –
light by motion.

Reducing the battery capacity by several times!

Autonomous solar lighting systems

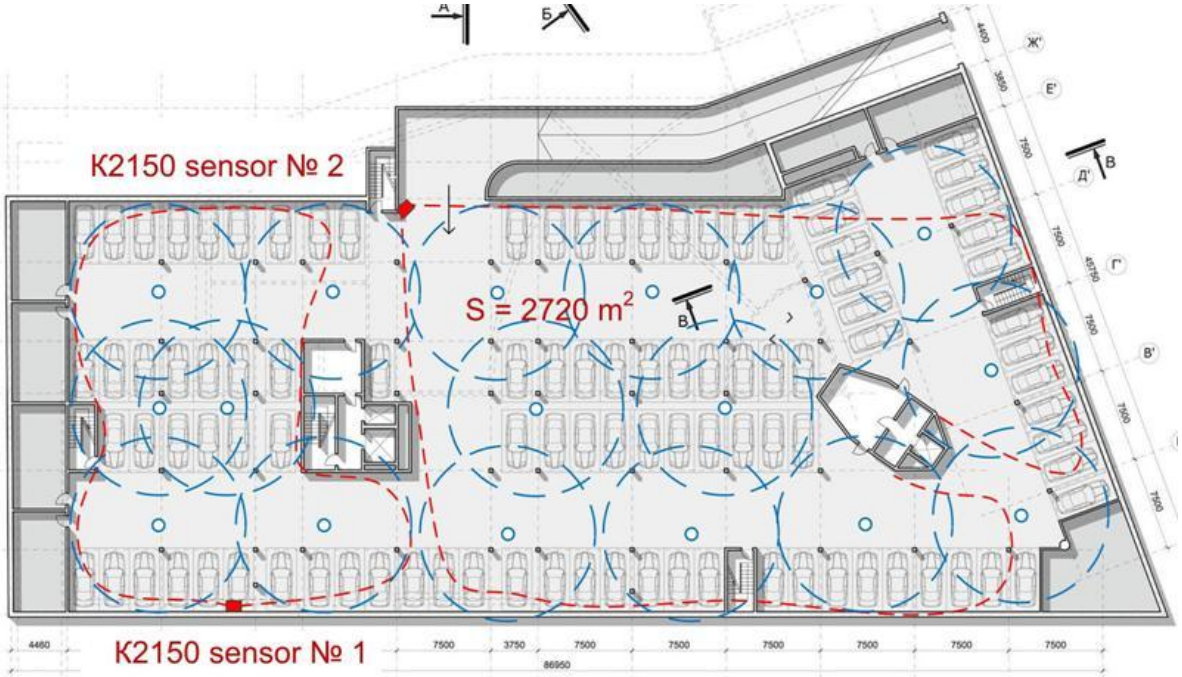






Reducing the battery capacity by several times!

Other sensor’s K2150 applications

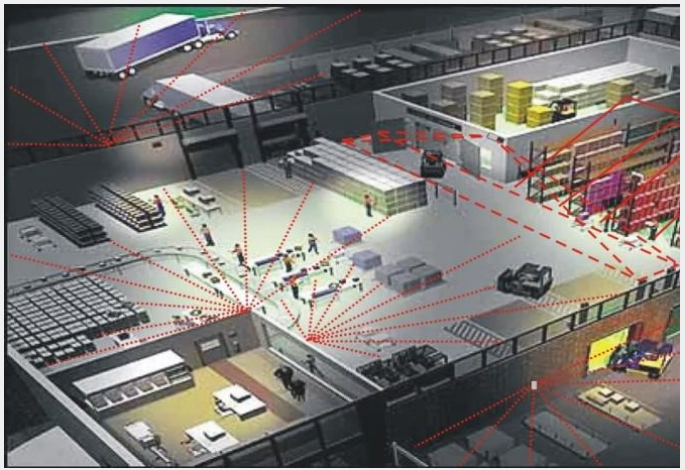


Two K2150 sensors instead of 17 ceiling PIR sensors in underground **car parking lot.**

Other sensor’s K2150 applications

Gas stations: ordinary and the ones without operators

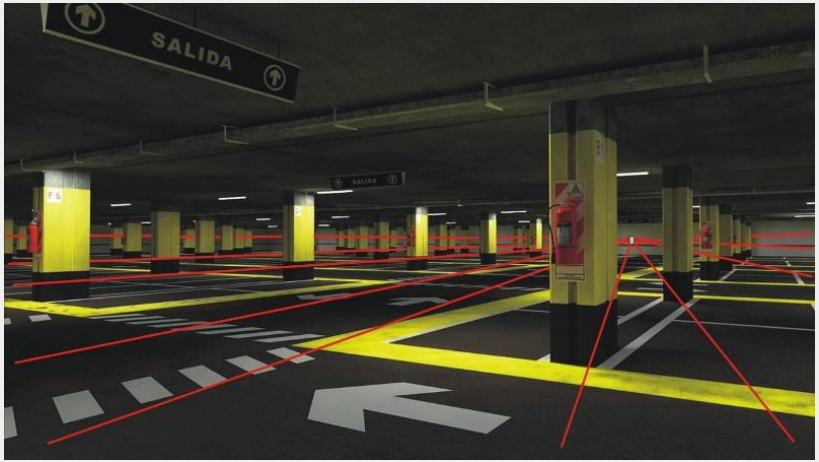
- Automatic lighting control
- IP cameras control



Smart factories: buildings and territories automation

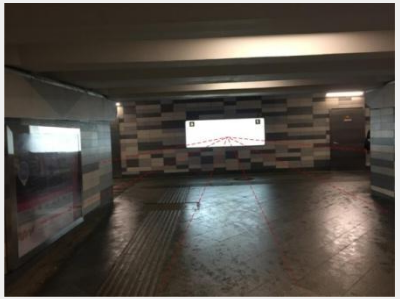
- Presence of a person or any moving object in an area of 10 to 3000 square meters
- Any output interface on request

Other sensor’s K2150 applications



Car parking lots

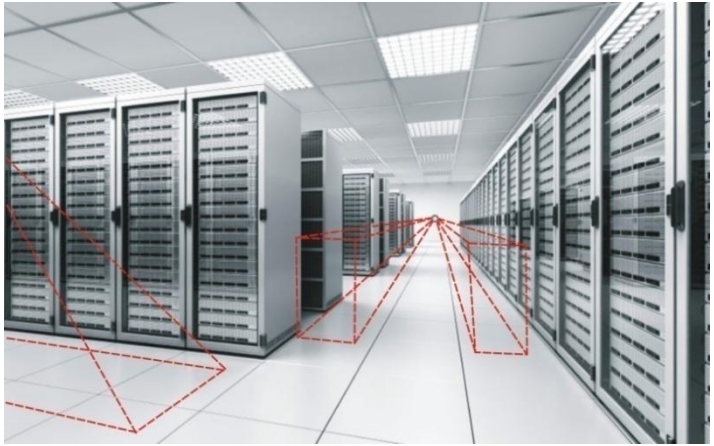
- Presence sensor K2150 has a big range – about 3000 sq.m
- One sensor replaces 6-8 PIR sensors
- The length of cable lines and the cost of installation reduces significantly

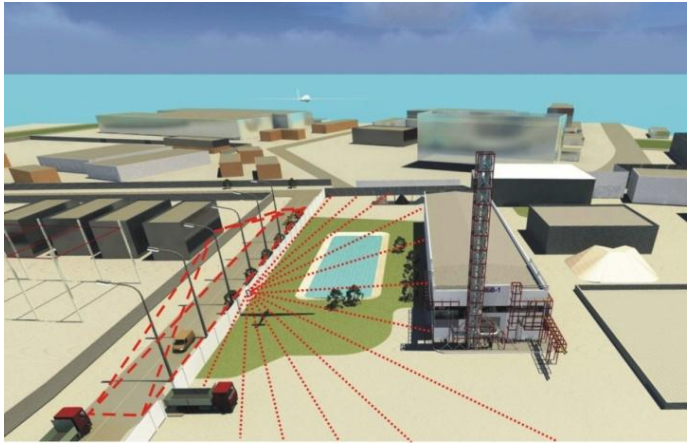


Pedestrian undercrossing

- When the undercrossing is empty, K2150 sensor smoothly reduces the lighting
- The sensor can be hidden behind any radiotransparent surface. For example, mounted into the light box.

Other sensor’s K2150 applications





Dmitrii Sazonov
Business Development Director
+90 5063165203
d.sazonov@lightbymotion.com

Victor Verbovsky
CEO
+382 68366543
va@lightbymotion.com

Topliski put, BB, Budva 85310, Montenegro

intelar
Light by motion

Member of
WORLD ALLIANCE *for* EFFICIENT SOLUTIONS | by SOLARIMPULSE FOUNDATION

Cost-effective technology with a short payback period