



HABITAT OPTIMISÉ, MAÎTRISE DE L'ÉNERGIE & SERVICES

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Synthesis: lighting sensors state of art

WP 5.3: L532A

E. LEGER / March 2009

Summary

1. Light sensors technology
 - Light dependant resistor
 - Photodiode
 - Phototransistor
2. Occupancy – presence sensors technology
 - PIR (Passive InfraRed)
 - US (Ultrasonic)

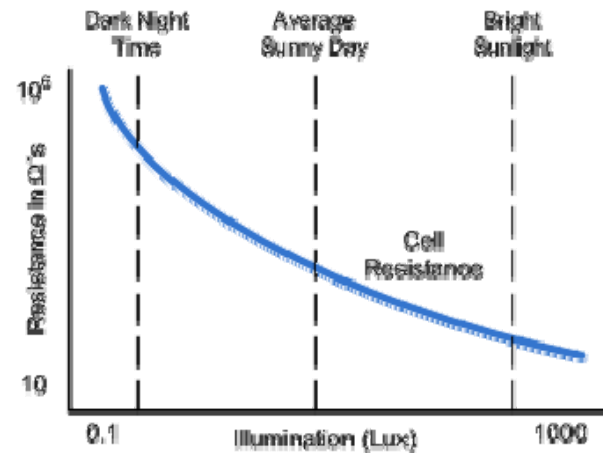
Light sensors technology



→ Light dependant resistor



- Cheap
- Simple control circuit
- Spectral response near those of human eye



- Light level detection for ON/OFF only
- Non linearity of resistance variation
- Memory effect of past illumination
- Drift response over time and temperature

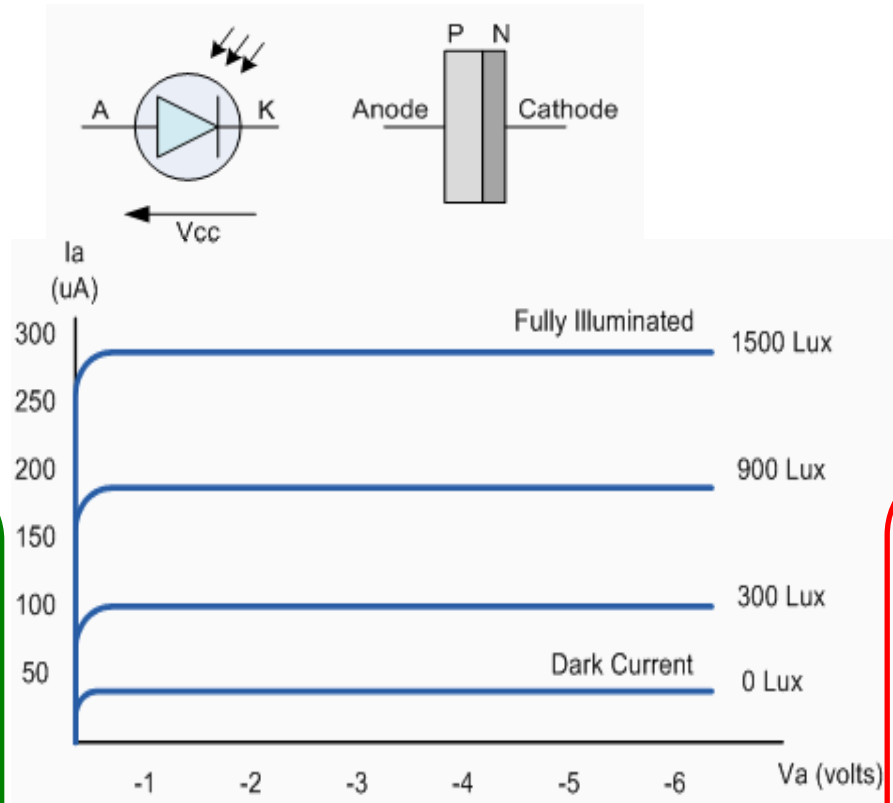
Light sensors technology



→ Photodiode



- Linearity
- Wide illuminance range
- Light adjustment capabilities by dimming



- Dark current
- Filter needed to match human eye spectral response
- Temperature influence
- Need additional amplification circuit for gain

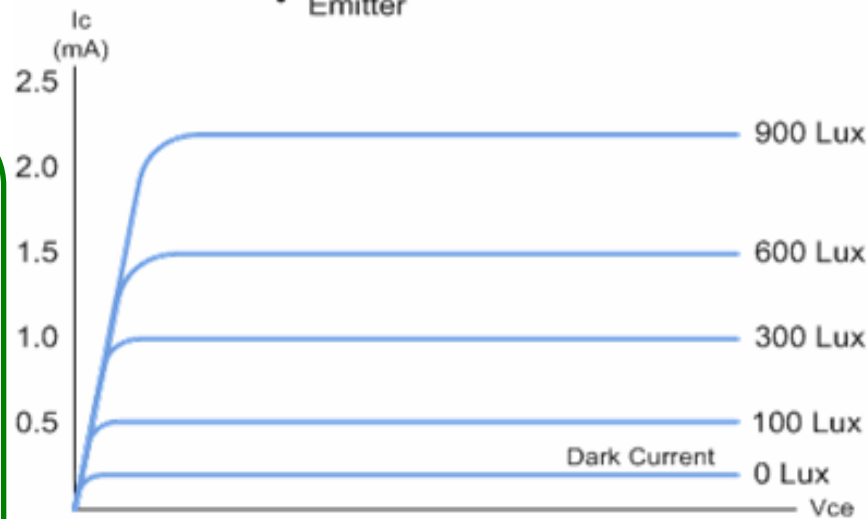
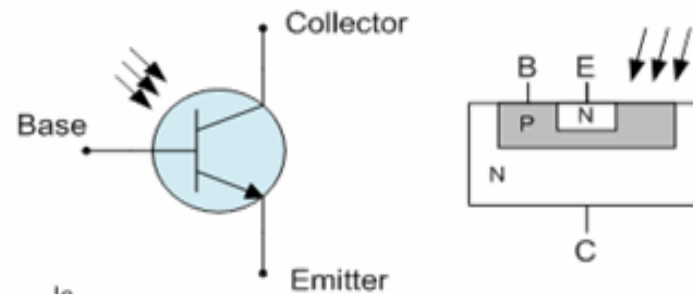
Light sensors technology



→ Phototransistor



- Linearity
- Wide illuminance range
- Light adjustment capabilities by dimming
- High internal gain (compared to photodiode)



- Dark current
- Filter needed to match human eye spectral response
- Temperature influence
- Time response higher than photodiode



Occupancy – Presence sensors technology

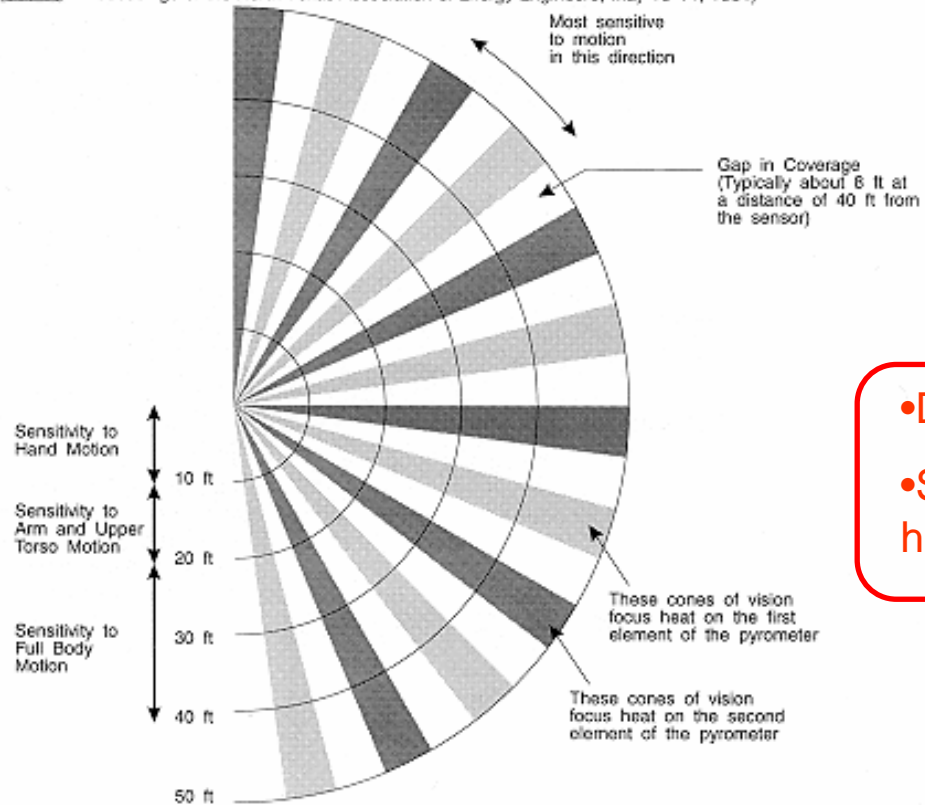


→ PIR (Passive InfraRed): conversion of IR energy into voltage signal



- Coverage patterns of different shapes
- Indoor and outdoor
- Mounting possibilities (wall, ceiling)

(Source: Proceedings of the North Texas Association of Energy Engineers, May 13-14, 1991)



- Direct line of sight
- Sensitive to every heat source

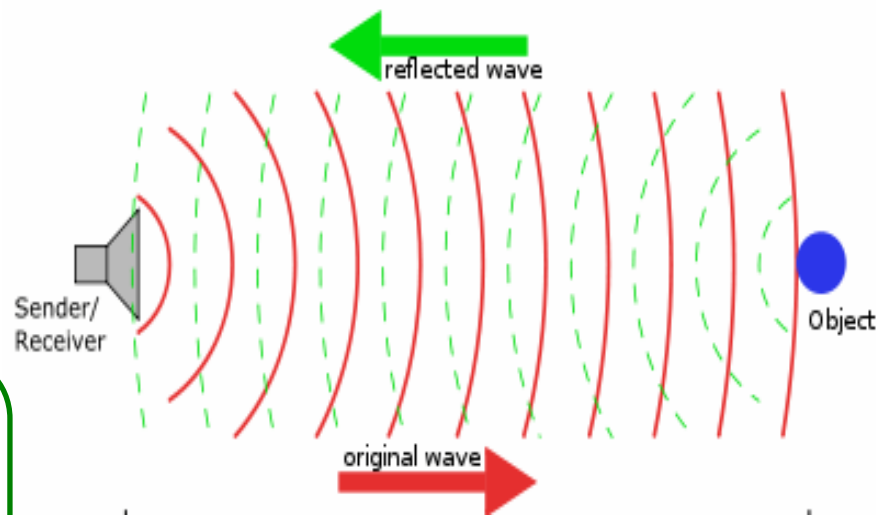
Occupancy – Presence sensors technology



→ US (Ultrasonic): generation of inaudible sound wave and echo evaluation



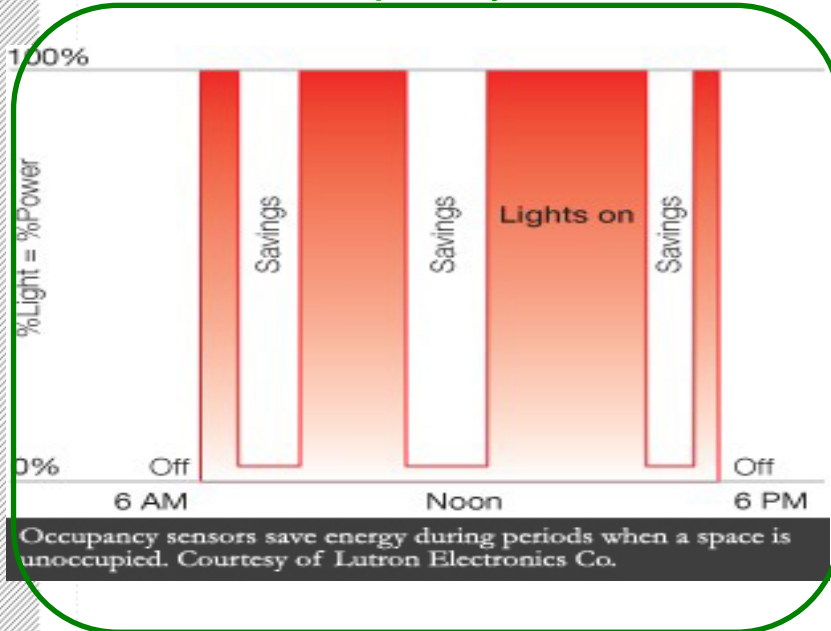
- Spaces with obstacles (volumetric covers)
- Mounting possibilities (wall, ceiling)



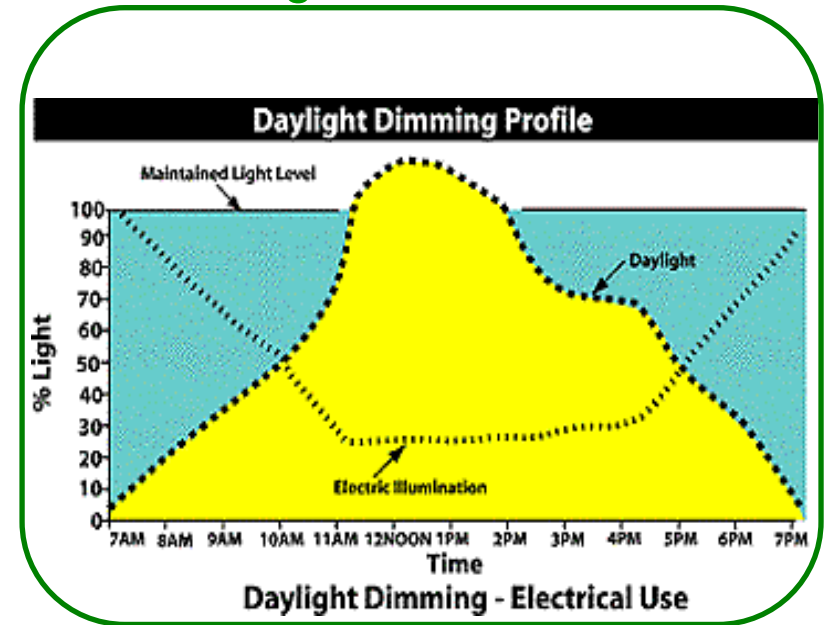
- Indoor only
- Incompatibility with high levels of vibration or airflow

Energy saving potential with lighting sensors

Occupancy sensors



Light sensors



Efficiency Strategy	Presence detection only savings (%)	Constant light control only savings (%)	Combined savings (%)
	18	28	40



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