



**The software that transforms commercial  
off-the-shelf 3D video cameras into  
state-of-the-art people counters/trackers**



**and beyond...**





# Traditional 3D people counters market



Mostly stereovision **proprietary** black boxes lacking interoperability





... for applications in:



[www.bigstock.com](http://www.bigstock.com) · 2034207



**Retail**



**Smart City**



**Access  
Control**



**Transports**

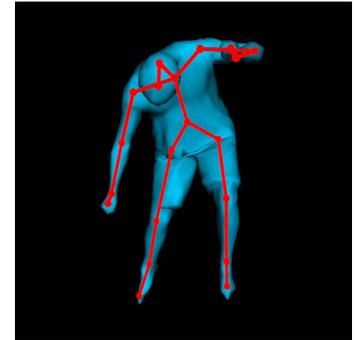
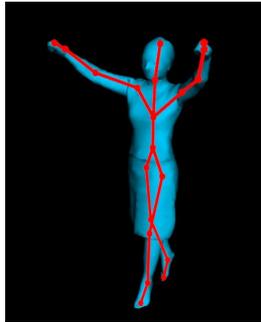




## The disruptive event



**Nov 2010:** Microsoft launches in North America Kinect, an Xbox accessory capable of simultaneous full body skeleton tracking of two players



Kinect, with a \$149.99 price tag, hits the 1 million units sold mark less than two weeks after its launch.



# The era of consumer 3D cameras was started



Very fast and unstructured evolution of the market in total absence of standards

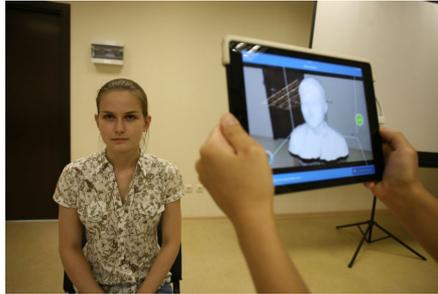




... for applications in:



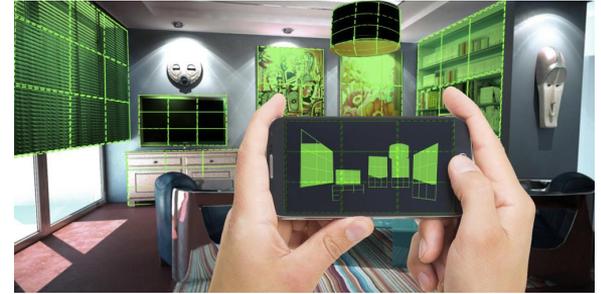
**Gaming, VR, AR**



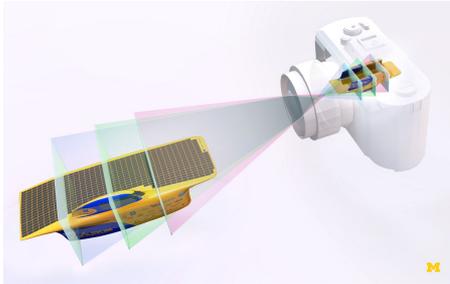
**3D scanning**



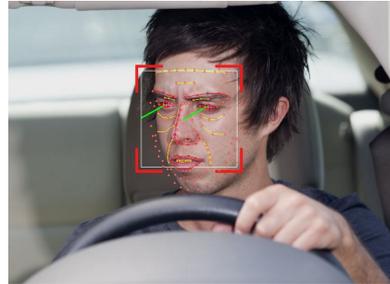
**Natural interfaces**



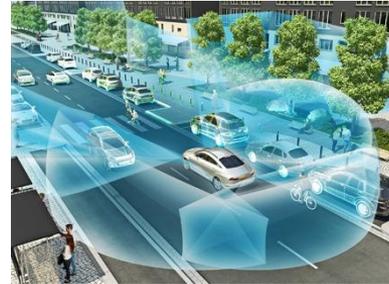
**3D mapping**



**Image refocus**



**Driver assistance**



**Assisted Driving**



**Drone and robot guidance**



... starring some gorilla players



**SONY**



**SoftKinetic**  
The Interface is You

**intel** **REALSENSE™**  
TECHNOLOGY



**PrimeSense™**  
Natural Interaction

**Microsoft**  
**KINECT**

**Google**  
**Tango**

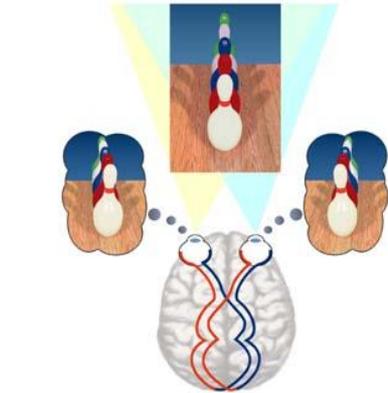
**HITACHI**  
Inspire the Next

**ENLITEON**

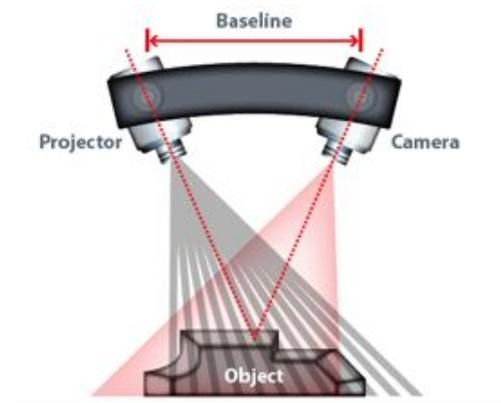


...with diverse technologies

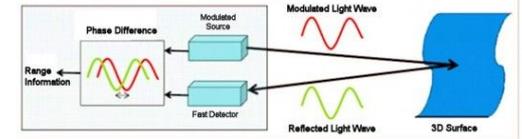
## Stereo Vision



## Structured Light



## Time of Flight ToF



## Lack of standardization



No standard interoperability protocols for 3D video sensors are available

No single manufacturer of 3D video sensors covers all market needs with a complete range



There is strong demand from integrators for a people tracking portable solution capable of guaranteeing abstraction, stability, backwards compatibility and an open API

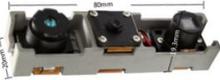
## People counter: make or buy?



Developing a 3D sensor requires know-how in embedded systems and image processing

Internal development has not been viable for many manufacturers and most integrators who had to opt for third party or OEM products

## COTS 3D cameras pricing

|                    |          |   |
|--------------------|----------|---|
| ORBBECC Astra      | \$149.99 |  |
| ORBBECC Astra mini | \$149.99 |  |
| ORBBECC Persee     | \$239.99 |  |
| INTEL D415         | \$149.00 |  |
| INTEL D435         | \$179.00 |  |

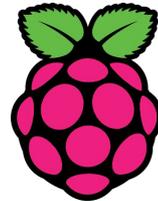
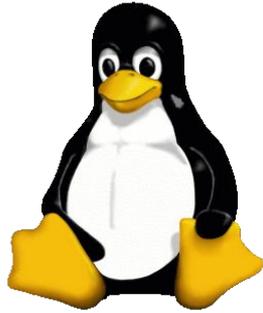
*Single quantity pricing (direct sale by manufacturers)*



# From 3D cameras to people counters



Consumer and industrial 3D cameras can be turned into people counting/tracking sensors by adding a CPU board and dedicated software.



RaspberryPi



**NVIDIA®**



## Comparison: a no brainer...



People sensors based on COTS consumer or industrial 3D cameras can differ from traditional people counters because they can be:

**more flexible**

**less expensive**

**less obtrusive**

**better looking**



# The ENLITEON architecture



ENLITEON betting on the superiority of COTS 3D cameras has developed a software platform addressing all the above needs





## A bet against proprietary systems



ENLITEON EDGE is a portable software platform running on open platforms such as Raspberry PI and Linux, designed to turn virtually any consumer 3D camera on the market into a state-of-the-art real-time people tracker



## Vision IoT data for Big Data analytics

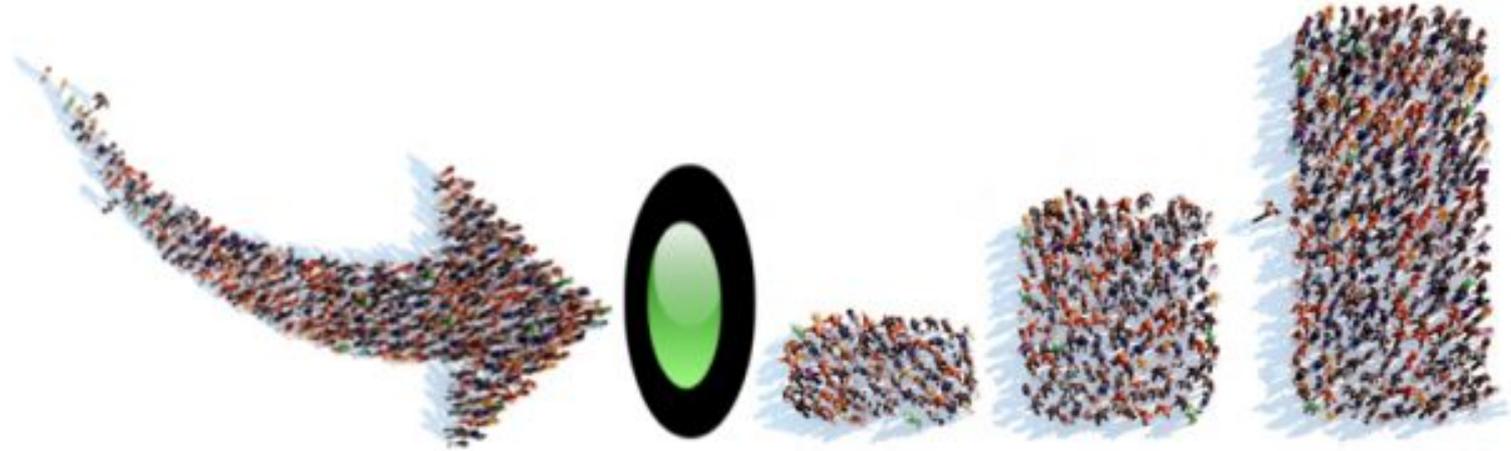


ENLITEON EDGE is a true IoT device capable of generating in real-time actionable data ready to be fed to third-party people behavior analytics and video indexing platforms





# Analytics: people counting





# Analytics: people tagging





# Analytics: people tracking





## A universal platform



Developed for platform independence  
ENLITEON EDGE is built on embedded Linux  
and can be ported to other operating systems.

EDGE currently runs on ARM, X86, NVIDIA  
Jetson boards



# Technology agnostic, vendor neutral



Being sensor technology agnostic it can handle Stereo vision, Structured Light, Time of Flight cameras

Strict vendor neutrality guarantees the interoperability required by corporate customers



## An integrator's nirvana



EDGE guarantees developers minimal time to market thanks to its MQTT and RESTful APIs

Long-term backwards software compatibility provides for unlimited future scaling up while preserving in time all prior investments