

IRIDENSENSE



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# Sense invisible colors in 3D

An advanced Multispectral 3D Perception solution  
to optimise resources and reduce carbon footprint



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1.

**The First 3D Multispectral LiDAR**



# About LiDARs

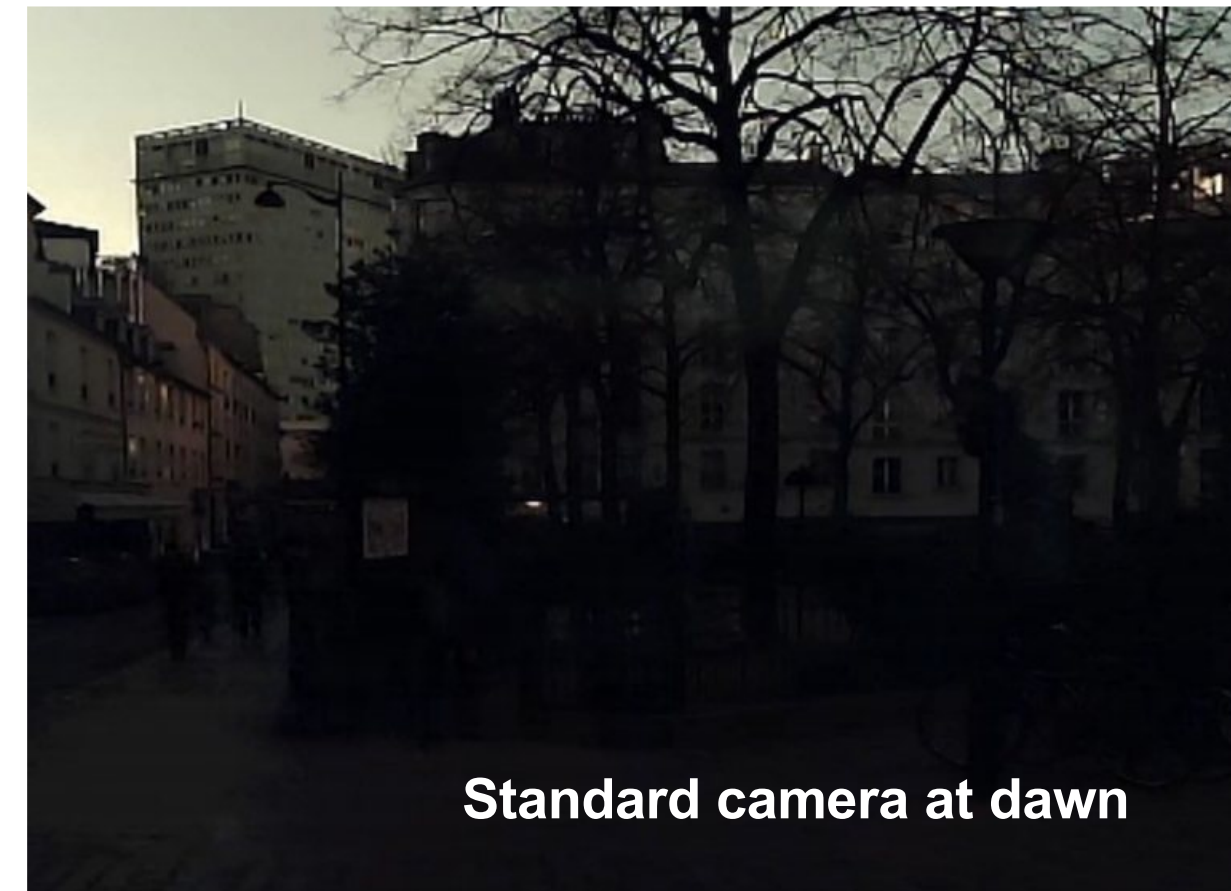
LiDARs are **active** sensors, emitting their own light

- Performances does not depend on lightning conditions
- Work as well at night than in daylight

LiDARs deliver native **3D** informations

- LiDAR delivers angles, distance and volume information
- 3D Region Of Interest (ROI) are easy to define to eliminate false detections
- Associated to SLAM algorithms they allow machines to localize themselves in their 3D environment

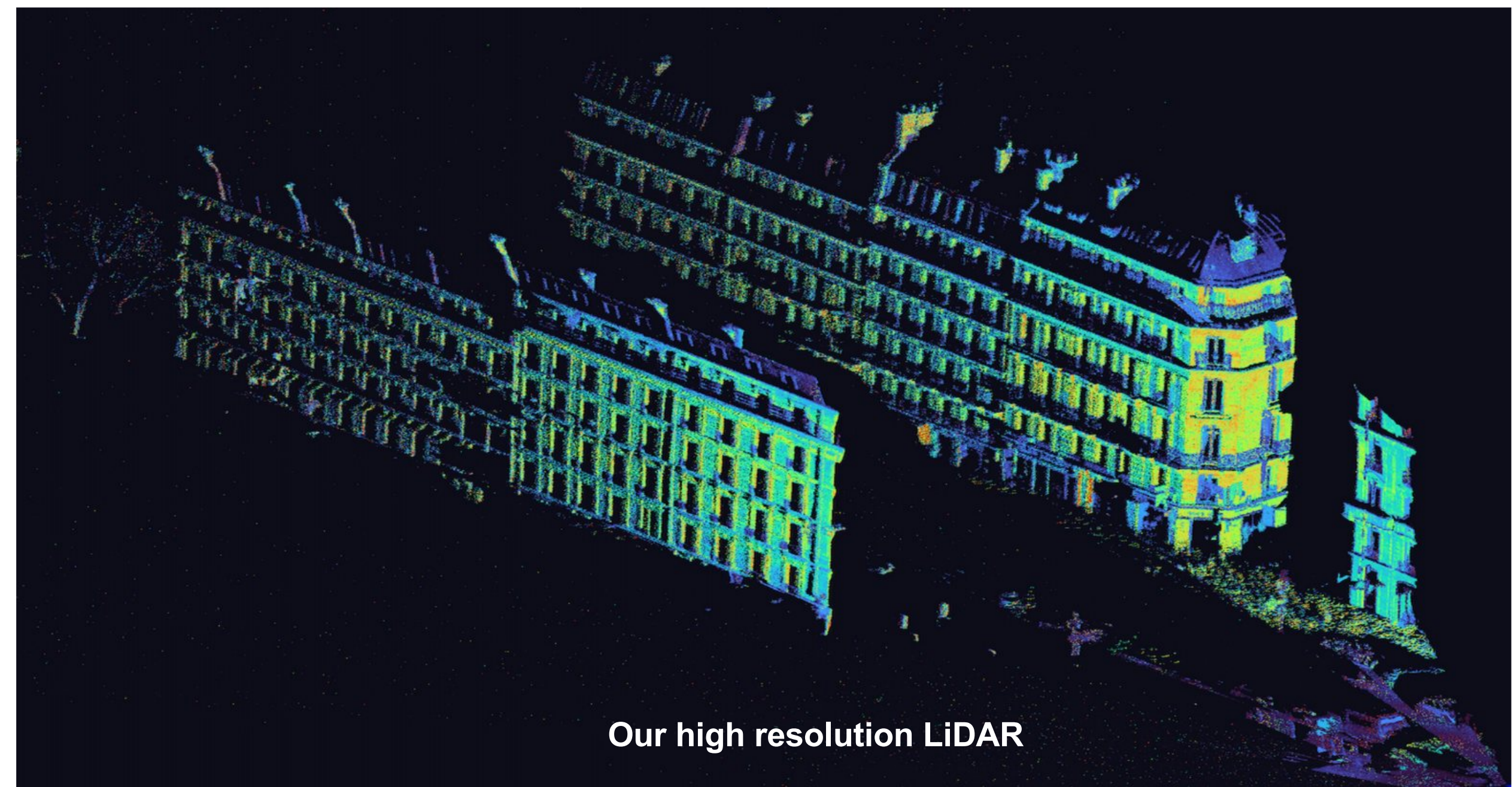
IRIDSENSE LiDAR is the only existing colour LiDAR



Standard camera at dawn



Our high resolution LiDAR



Our high resolution LiDAR

## The Key features of our Deeptech LiDAR

- **Long Range** LiDAR (300m) based on a unique robust and low cost laser technology
- **7 colors** LiDAR : 3 colors in the visible (RGB) and 4 colors in the infrared (SWIR)
- **Very High resolution**, beat the one of standards 2D cameras



To Map / monitor the environment in 3 Dimensions and recognize the chemical composition of objects

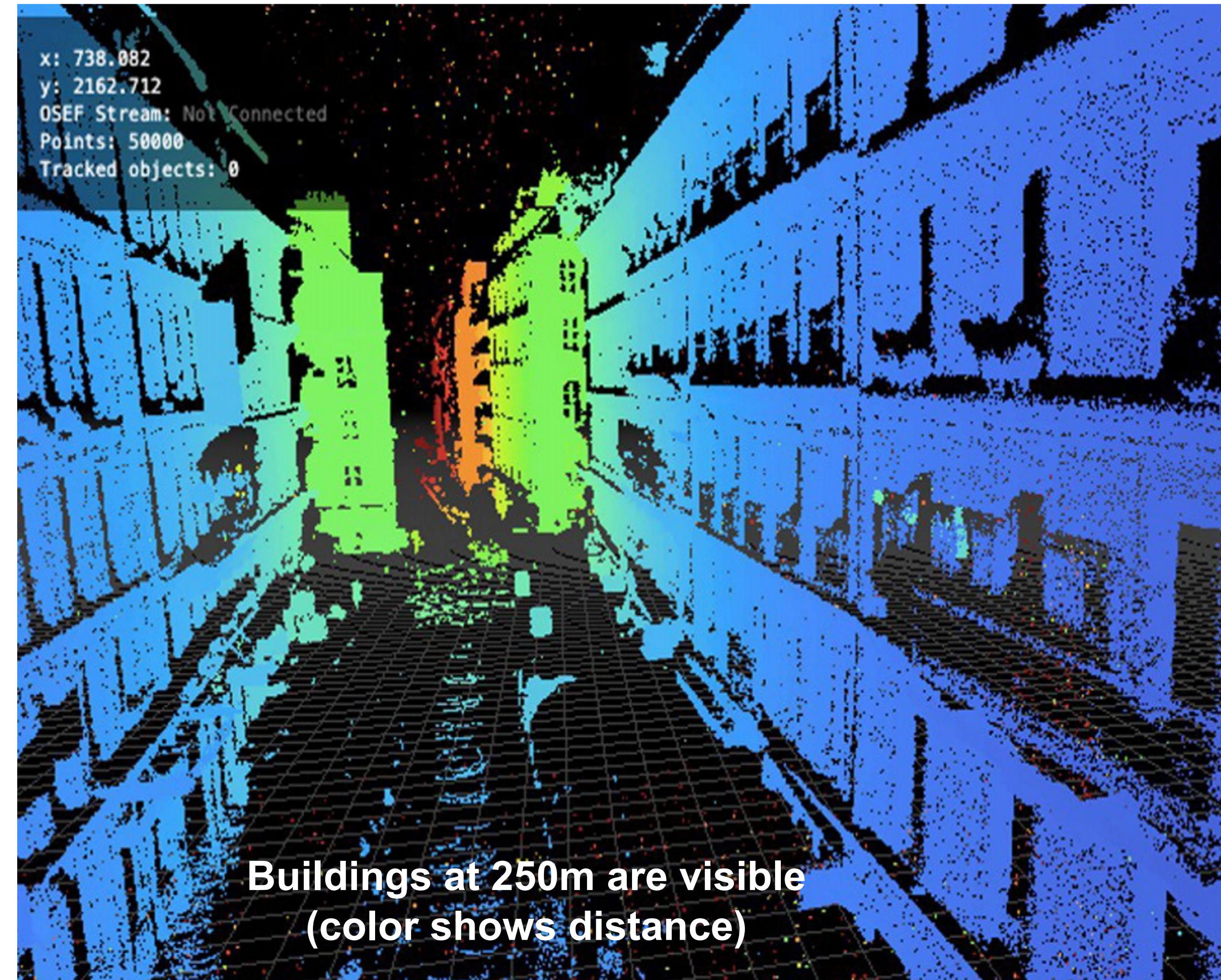
# A Long Range LiDAR (300m) based on a unique laser technology

SWIR emission (1400-1700nm), many advantages

- Higher power allowed / eye safety allows high range 300m, 200m @10% reflectivity
- 10 times higher resistance to sun blooming

A unique asset

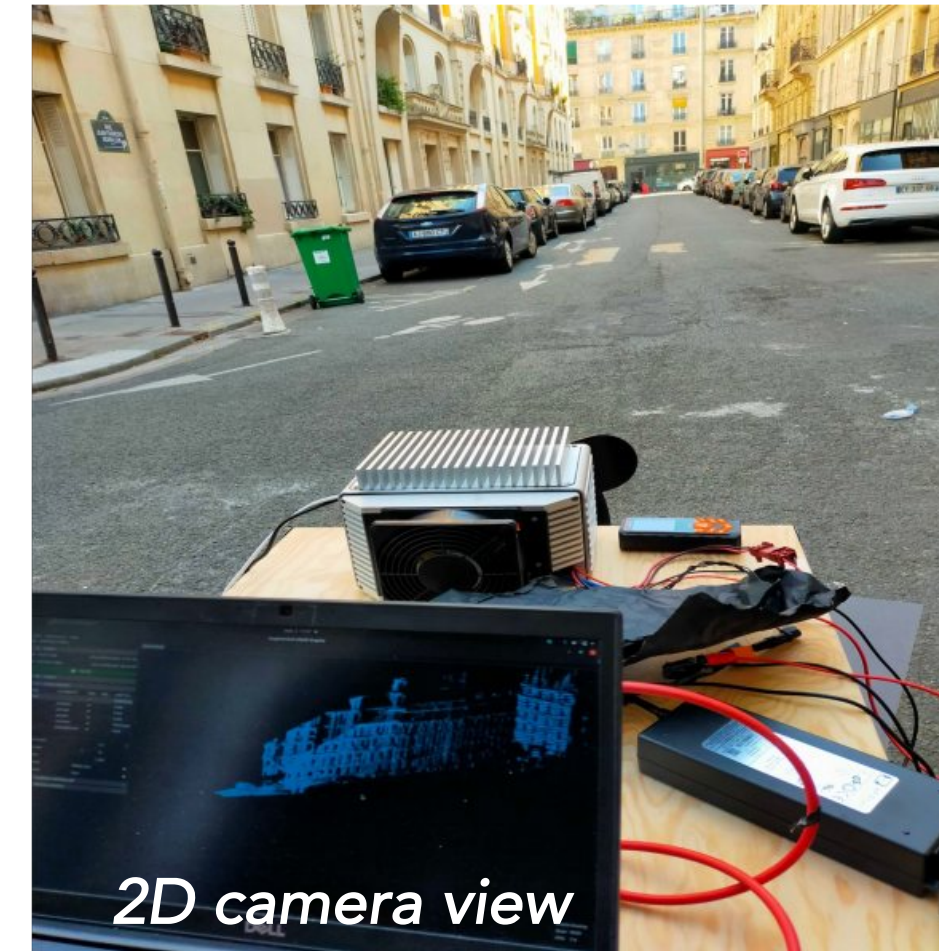
- Proprietary **robust and low cost** solid state laser technology >3kW peak, ns, 500kHz, wideband in SWIR



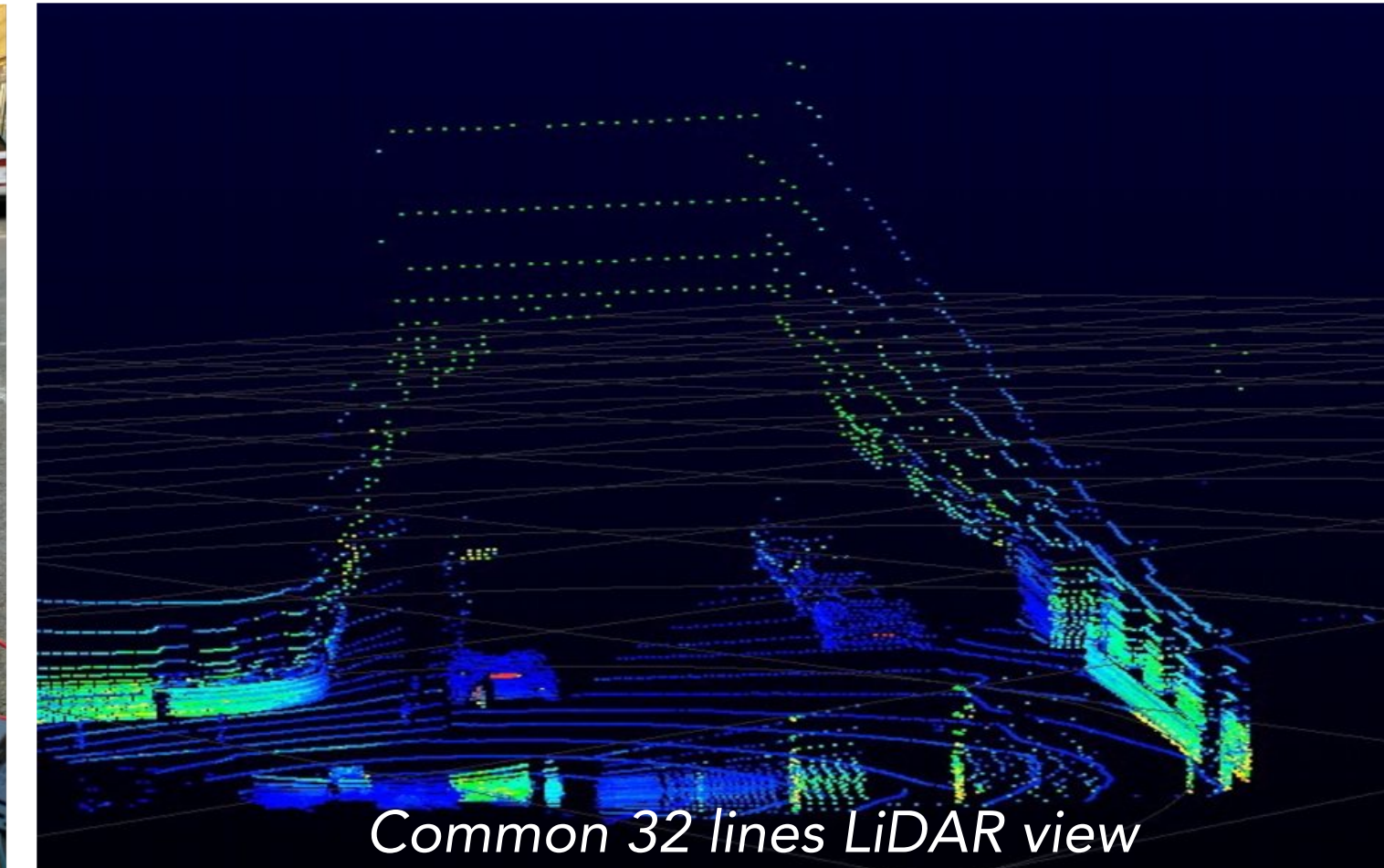
# A High resolution 3D LiDAR

- Most of existing LiDAR have poor resolution because their scanning pattern is repetitive
- Our LiDAR is high resolution because at each frame, the laser beam is scanned at different position of space
- Instantaneous perception is much richer in static but also in dynamic

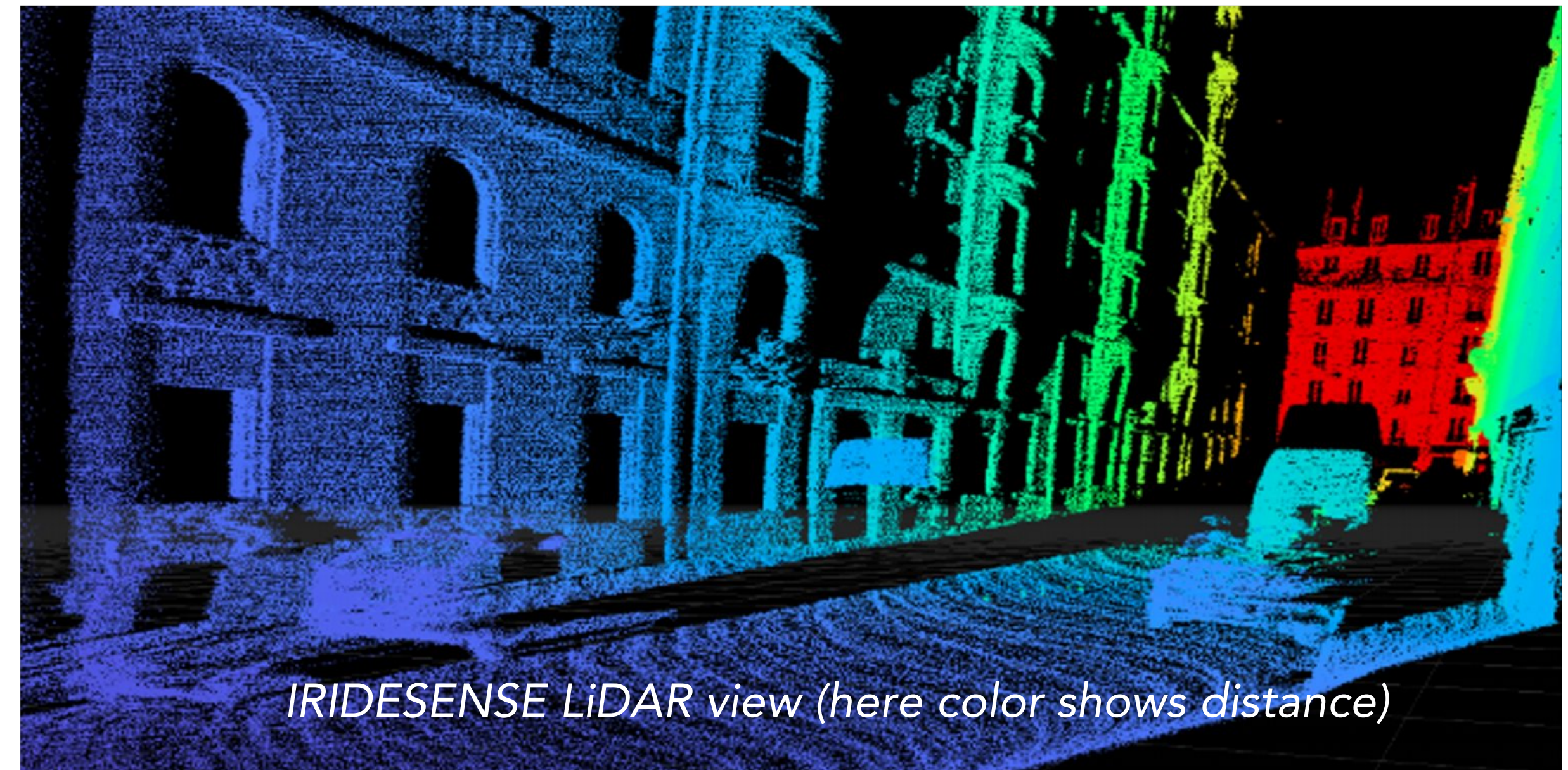
*Example: same street seen with IRIDENSENSE high resolution LiDAR and a 32 lines LiDAR*



2D camera view



Common 32 lines LiDAR view



IRIDENSENSE LiDAR view (here color shows distance)

# Multispectral in SWIR allows to recognize the chemical composition of objects

Many materials have absorption bands in SWIR

Water content detection was demonstrated

*Standard camera shows black soil whatever the water content, IRIDSENSE LiDAR shows different grades of soil humidity, same for plants.*

But also metal, different plastics, wood versus stone, living wood/dead wood, kinds of stones, moisture ...

With the adequate software (AI based)

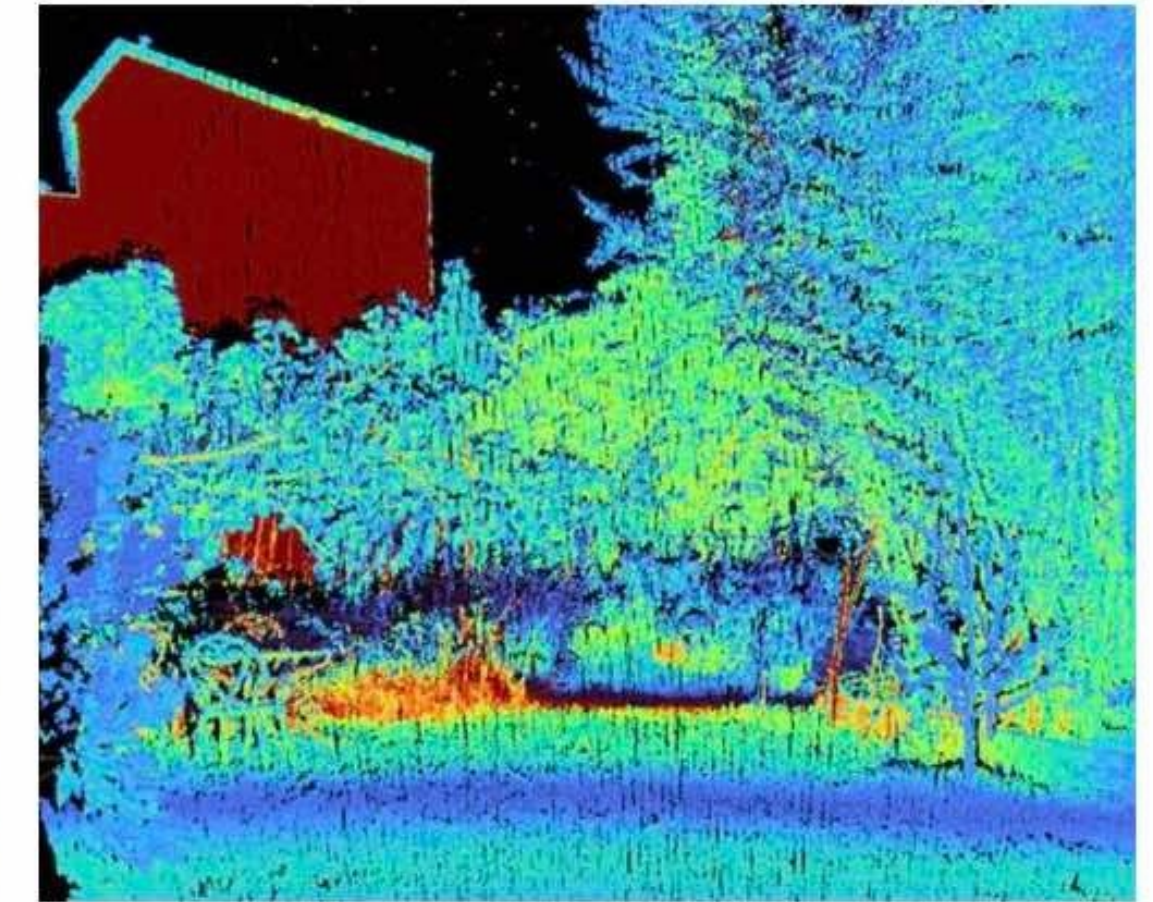


## 3D Multispectral Perception Solution

Standard 2D camera view



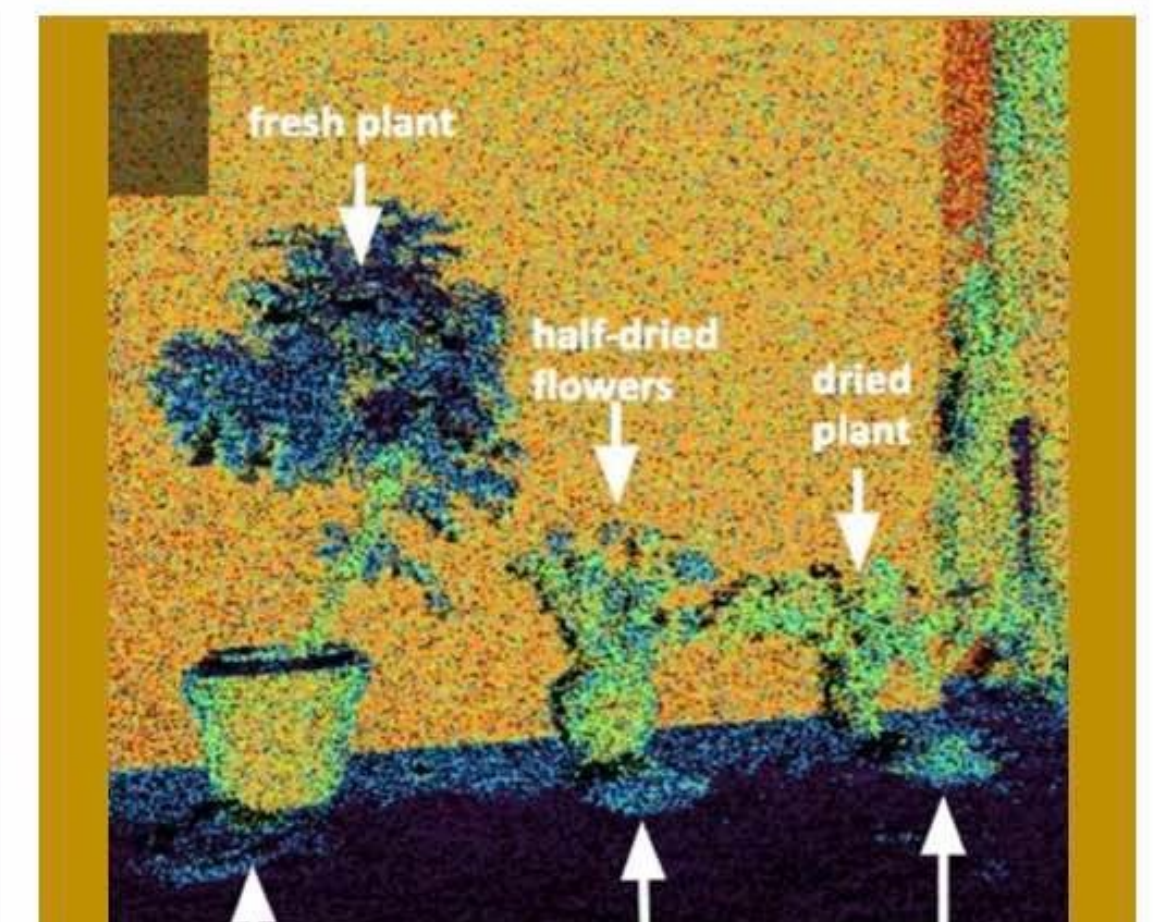
Multispectral LiDAR view



watered  
soil

half  
watered  
soil

dry soil



watered  
soil

half  
watered  
soil

dry soil

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2.

## Competitive Landscape



# Comparison with competition (new generation of LiDARs in US, Israel and China)

IRIDSENSE LiDAR gets all the best features (SWIR, long range, high resolution)

We have the first Worldwide Long Range Multispectral LiDAR



We won both the **Best of Innovation Award** from 2020 Consumer Electronic Show and the 2020 **Prism Awards** from Photonic West exhibition.



	Livox (DJI)	Luminar	IRIDSENSE LiDAR
Wavelength	905 nm	1550 nm	1400-1700 nm
Laser source	VCSEL	Fiber based	Solid State
Points/s	452k	500k (x2)	500k
Range @10% R	150 m	250 m	200 m
FoV	120° x 25 °	60°x 26° (x2)	90°x 50°
Pattern	High Resolution	Low Resolution	High Resolution + Multispectral !

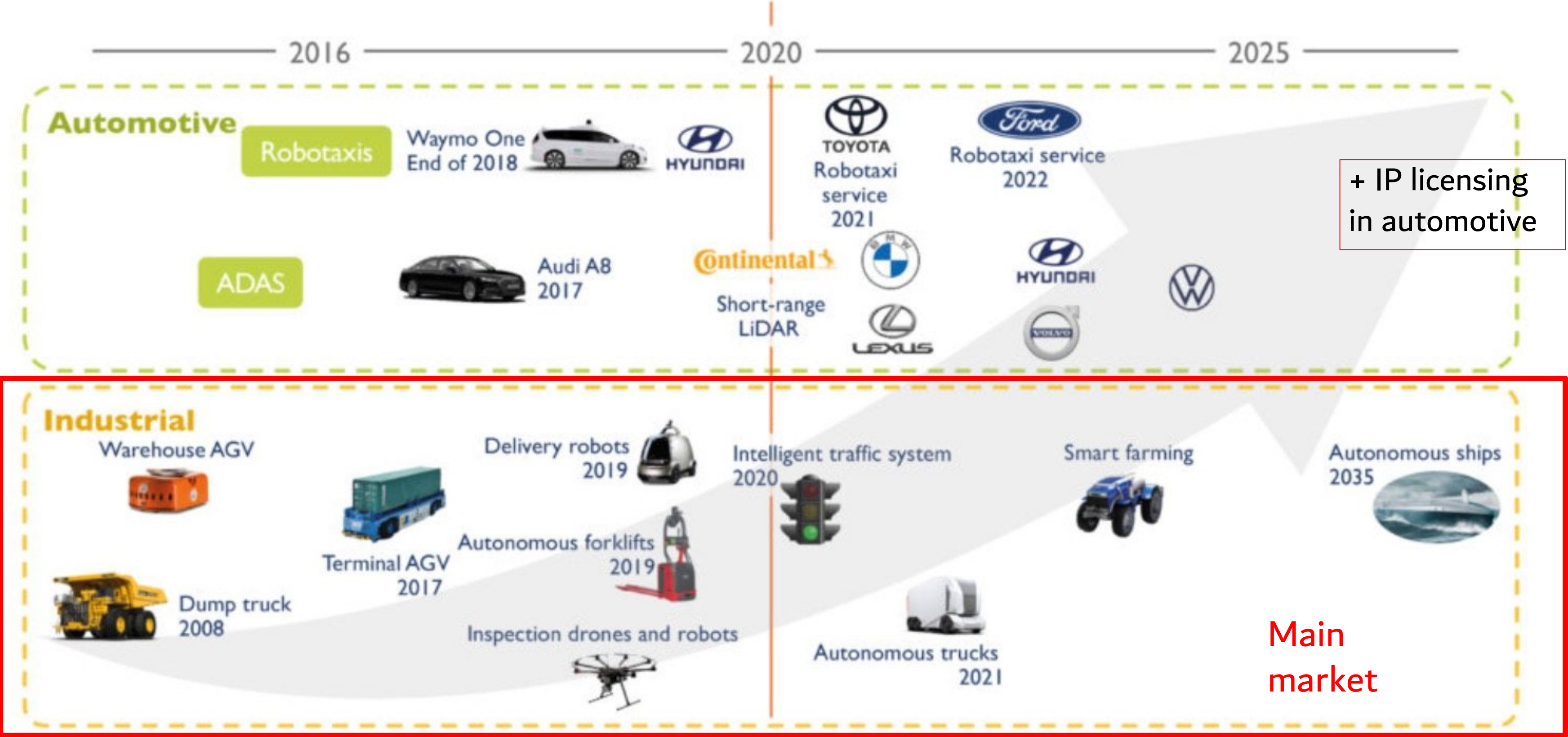
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# 3. Markets



# Automotive and industrial LiDAR roadmap

(Source: LiDAR for Automotive and Industrial Applications report, Yole Développement, 2020)



## Markets – First to be explored

### Mining

SWIR + RGB LiDAR allows to recognize the different types of ores

Exploration and 3D cartography  
Simultaneous volume measurement and ore recognition  
Active, no lightning required  
Machine localization /navigation inside tunnels

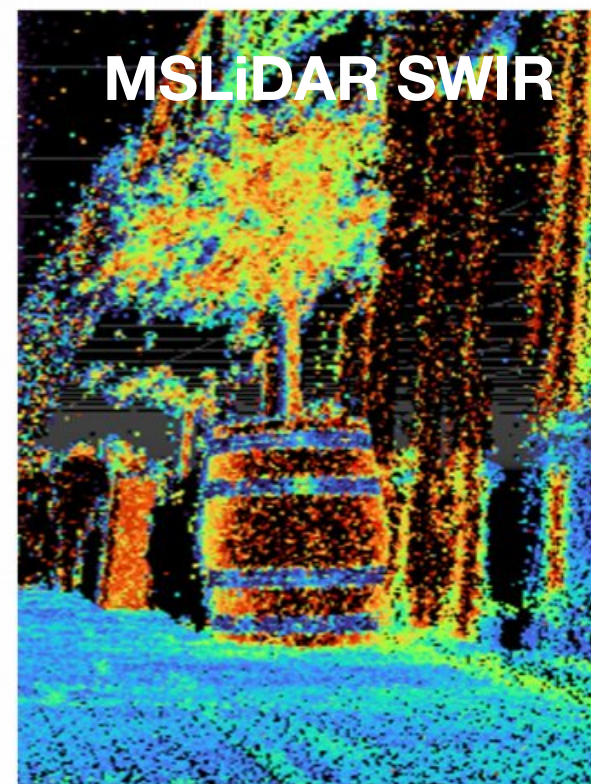


Discussions with customers started

### Agriculture and Forests

SWIR + RGB LiDAR allows to recognize the different types of vegetation and their water content

Combined monitoring of growth/volumes and hydration  
Species and pest monitoring  
No lightning dependency

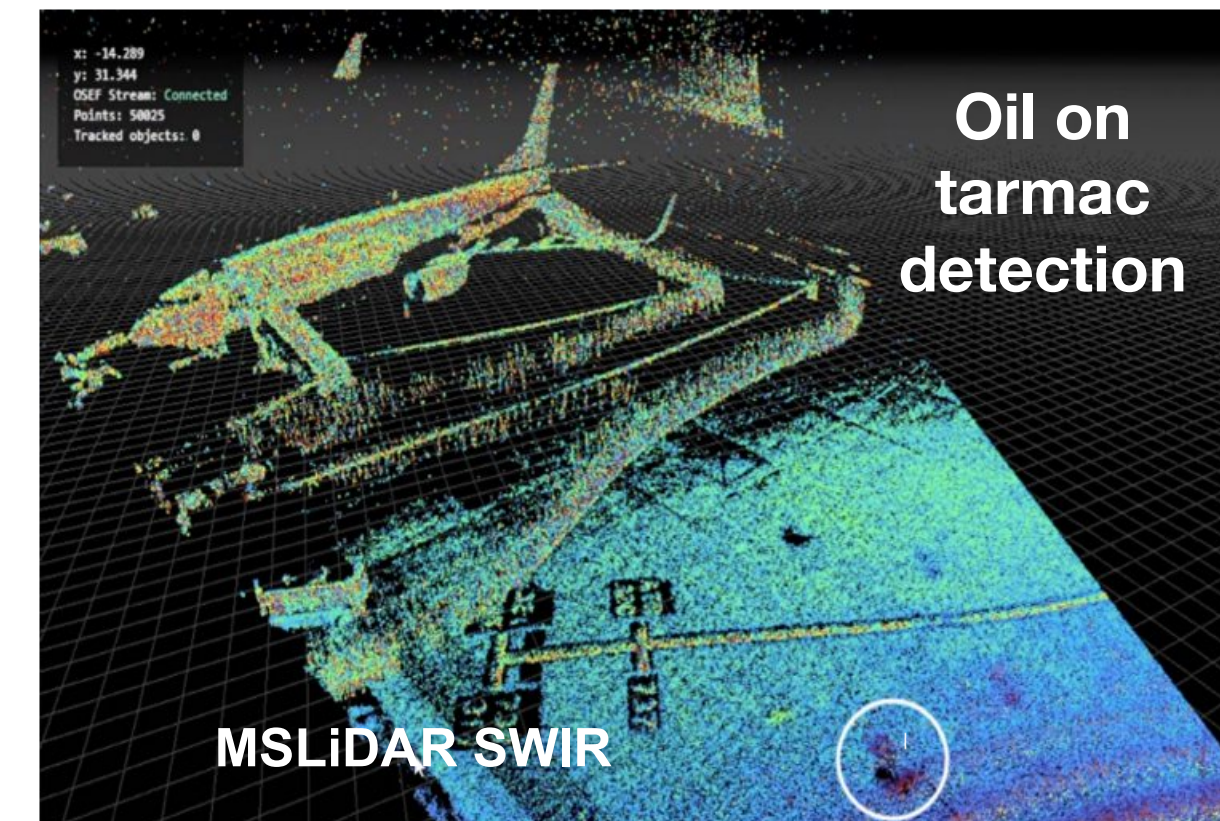


Discussions with customers started

### Airports

SWIR + RGB LiDAR allows to segment the tarmac scenes

Monitoring of boarding gates  
Detection of lost / dangerous objects  
Detection of pollutants (oil...)  
Monitoring of aircraft repairs



Discussions with customers started

Many others are potentially addressable (waste processing, logistics, infrastructure monitoring, security and defense, metaverse, forensic....)

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4.  
Impact



# We work for the planet !



3D shapes monitoring associated to multispectral analysis capability is a key asset for precision agriculture and forest management.

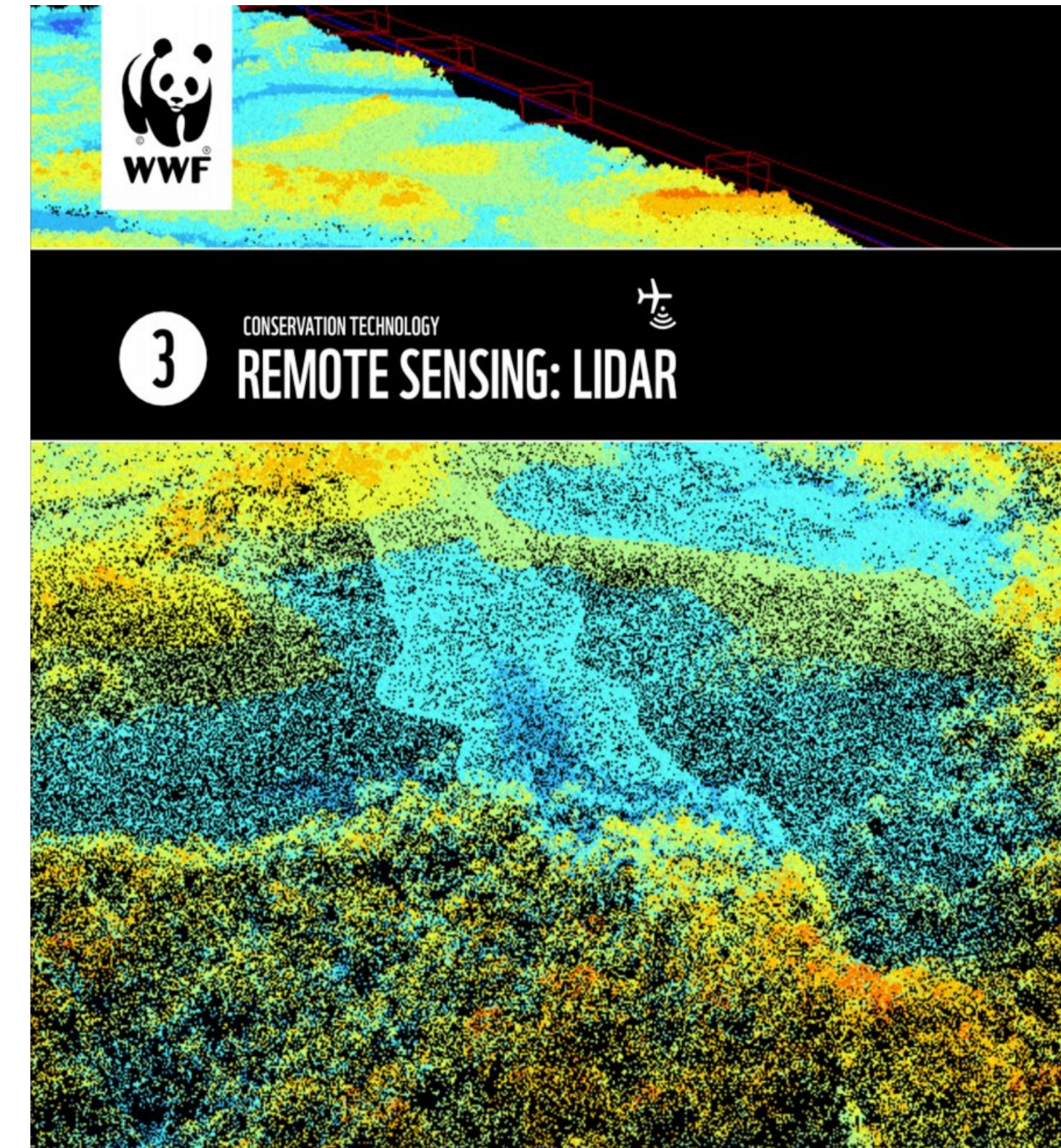
## Precision agriculture

- Watering is done only when needed
- Pest are detected as soon as possible minimizing the use of pesticides

## Forest management

- Pest monitoring is mandatory for forests endangered by climatic changes survey
- Biodiversity monitoring by detecting the different type of trees

➡ **Water preservation, pesticides limitation, deforestation surveillance, biodiversity monitoring, pollutant detection ...**



IRIDSENSE's Green LiDAR project has received funding from the European Union's EIC Accelerator under Grant Agreement N° 101010266

# We work for the planet !

## Other Markets / Examples



### Mining

Volume detection and ore recognition at the earliest allows to save millions of trucks kms

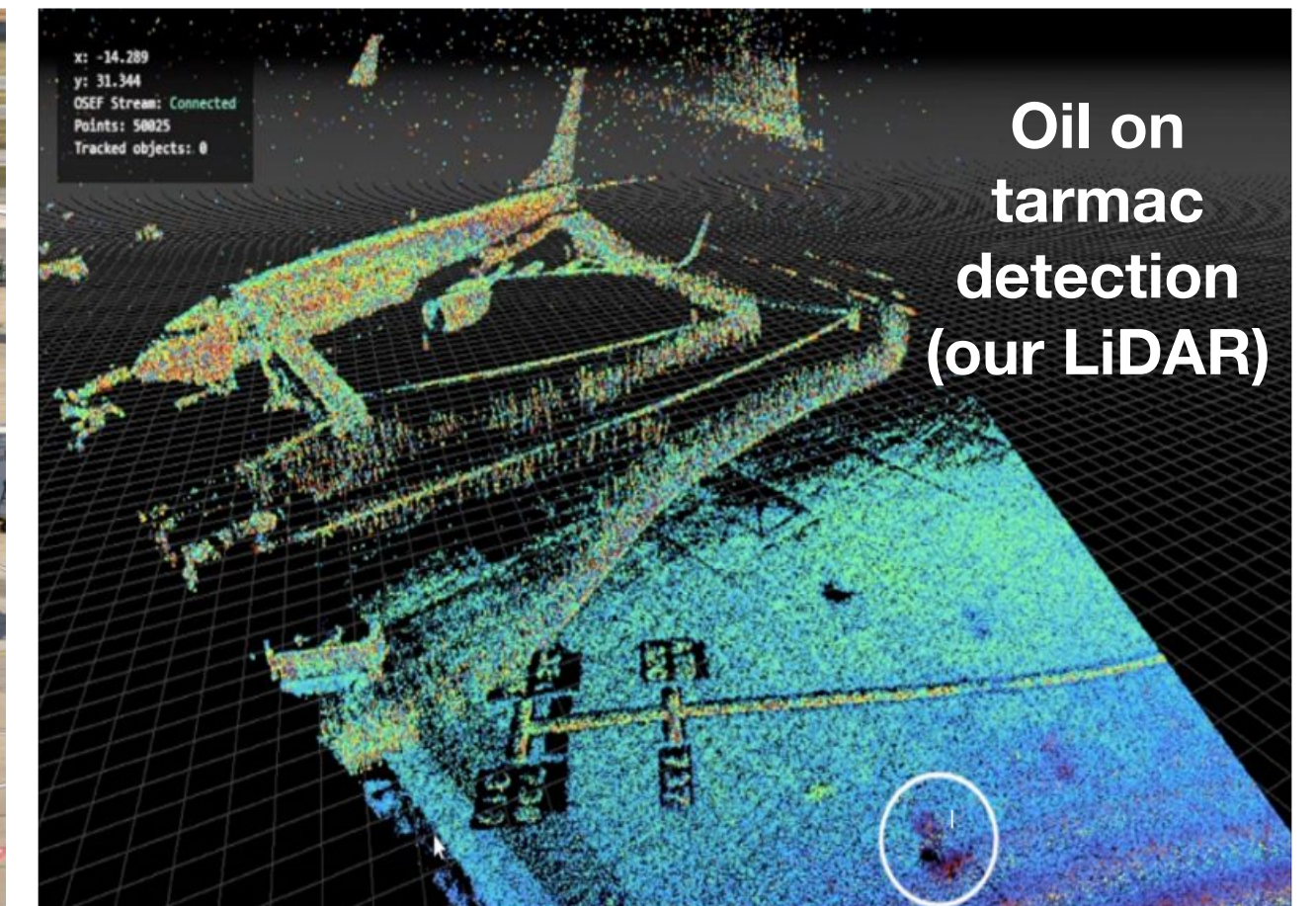
➡ Reduced Mining Carbon footprint



### Airports

Pollutants detection and aircraft motors and trafic monitoring

➡ Reduced Airport Carbon/pollution footprint



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5.

The company, the IP, the team



## History and IP situation

- The first demonstrations of a compact multispectral lidar device based on a fitted laser source were done by MIT Lincoln Laboratory (Lexington, MA) in the late 1990s (*S. Buchter and J. J. Zayhowski, MIT Lincoln Laboratory Solid State Research, 1, 1–3 (1999)*)
- In 2019, Scott Buchner sold its laser technology to a new company called Outsight created to develop and market the Multispectral Lidar technology for Automotive.
- From 2019 to 2022, the Multispectral LiDAR was developed within Outsight and working prototypes reaching specifications were built.
- In 2022, Outsight decided to focus on LiDAR agnostic Software business and to spin-off the Multispectral LiDAR activity
- In Q1 2023, Iridesense was created with 3 founders, Nadine Buard and Elise Chevallard who developed the Multispectral LiDAR at Outsight and Eric Carreel a well known french serial entrepreneur in hardware related business.
- In April 2023, Outsight will enter Iridesense capital (12%), bringing the IP, and key employees will join.

**IRIDSENSE gets the full property of the IP (Laser and LiDAR) and inherits of 4 years of R&D**

# The Founders

**Nadine Buard**

Engineer from ESPCI Paris-Tech, PHD (Sorbonne Univ)  
INSEAD FAST (short MBA program), IFA  
17 years at Airbus Corp. Research  
10 years in start-ups as Head of R&D (Withings, Invoxia, Outsight)  
Expert for EU FP7 and Horizon 2020  
30+ patents  
Nadine developped innovative sensors that are sold in Millions  
Optronic and sensors technology lover  
Anticipation, Creativity

**President and CEO****Eric Carreel**

Engineer from ESPCI Paris-Tech, PHD (Sorbonne Univ)  
Founder and President of successfull startup : Inventel (sold to Thomson), Withings, Invoxia, Sculteo, Zoov.  
50+ patents  
Eric has built multi-national teams of hundreds of engineers from scratch and deployed Millions of products combining complex hardware & software (B2C, B2B)  
Technology lover – Business and manufacturing skills- Leadership

**Mentor****Elise Chevallard**

Engineer from Institut d'Optique Graduate School  
Elise experienced shortly the automotive industry than joined Outsight where she drove the development of the Multispectral LiDAR, dealing with hardware, optics and software teams  
Dynamism, product delivery mindset

**Head of Programs**

# The Core Team

We are hiring !

- Engineers / Application Engineers
- Business Developer
- Marketing

Elise,  
Programs  
and Optics

J rome,  
COO

Nesrine,  
Optics

Yohann, data  
processing and  
calibration

Malik,  
Electronics

Nadine,  
CEO

Youssef,  
Mechanics and industrialisation



Miika,  
Laser Seed



Timo,  
Laser Seed

Consulting (Finland)

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Thank you

